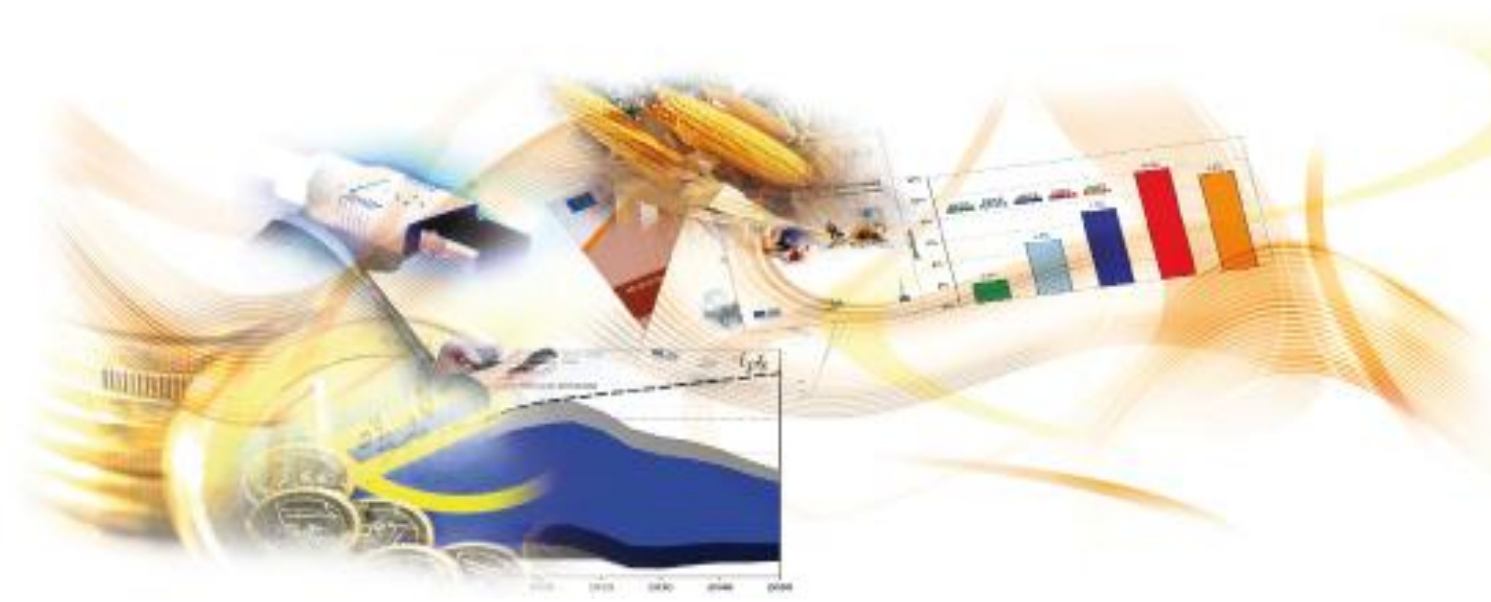


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The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context.

The first draft of this report was produced in December 2012 and was focused on developments taking place in the previous twelve months. In particular, it has benefitted from the comments and suggestions of Karel HAEGEMAN from JRC-IPTS. The contributions and comments from DG-RTD are also gratefully acknowledged.

The report is currently only published in electronic format and is available on the [ERAWATCH website](#). Comments on this report are welcome and should be addressed to jrc-ipts-crawatch-helpdesk@ec.europa.eu.

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EXECUTIVE SUMMARY

Research and innovation policy in Belgium is designed and implemented in a multi-level governance framework involving the Federal Government and autonomous regional and (linguistic) community governments. Although complex, the clear constitutional demarcation of responsibilities means that in practice there is no reason for the various authorities not to be able to design and implement effective policies. Indeed, the possibility for the three regions (Brussels-Capital, Flanders and Wallonia) to design policies that suit the specific needs of their business sectors for innovation and that are tailored to optimise the potential of their higher education research capacities can be considered as positive.

Despite a commitment by all of the competent Belgian authorities to meet the 3% gross expenditure on R&D (GERD) in gross domestic product (GDP) target, GERD has only increased marginally in absolute terms in recent years. In 2011 it was just above 2%. Despite the fact that R&D tax credits make up approximately €500 million additional public support, **public expenditure on R&D remains the weak link** in the Belgian system. Public sector funding for R&D is unlikely to increase in the short term given the need for budgetary rigour. Even business investment in R&D which historically has been very strong has begun to show signs of weakening in recent years despite a recovery in 2011 (increase of 7.2% with respect to 2010). One way forward might be to consider lessening the focus on very resource intensive hi-tech innovation in favour of prioritising 'low-tech', service-oriented and/or entrepreneurial types of innovation. Also, focused support for young innovative companies and multinational firms that choose Belgium for their R&D headquarters could broaden the business base. This would require a review of the legal framework for intellectual property rights, the tax burden and administrative red tape.

Belgium, although not among the innovation leaders in the EU, is placed first in the second tier of 'innovation followers' in the Innovation Union Scoreboard 2011 (IUS, 2011) and over the last five years has achieved moderate growth in innovation performance. The country has a strong, internationally competitive research infrastructure (most importantly its universities and a handful of major research facilities) driven by a globally connected and highly productive workforce. At the same time, the business sector in Belgium is significantly more active than the EU-27 average in terms of both the financing and performance of research and development (R&D). A small number of foreign owned companies play a key role in underpinning this strong performance with the R&D investments of a few large companies in a limited number of sectors and mostly managed overseas making significant impact on the performance figures. As a whole, the country is characterised by the relatively large share of SMEs, which typically make lower R&D investments as well as having lower absorptive capacity for knowledge. One important challenge is to **link research capacities to the economic eco-system**. Several measures are in place in each region aimed at economic exploitation of research, but it seems that research outputs are not aligned with the absorptive capacity of the SME-dominated economy.

While Belgium has strengths in terms of openness and international knowledge exchange and a well educated population, it needs to **improve its human resource base in science and technology**. Apart from policies to improve the comparatively poor working conditions for researchers (salary, career prospects, financing for projects) increasing the numbers choosing to enter the profession (e.g. awareness and image-improving campaigns), improving the number of graduates in the S&T domains and creating easier access to the labour market for an increased number of foreign graduates are areas for improvement, e.g. overcome language barriers to attract more students from abroad. To this end, a number of programmes have been setup in communities and regions, and partnerships for researchers have been created, such as the

Wallonia-Brussels Partnership for Researchers which was set up in 2011, where public authorities undertake, alongside the research stakeholders, to place researchers at the centre of the agenda for the consolidation of research as a driver of the future.

On the institutional level, there is a **need for enhanced co-ordination between the authorities** in terms of the use of financial resources available and the deployment of specialised staff required to pursue common objectives. Similarly, the remaining responsibilities of the Federal Government, in fields such as taxation, corporate law (including intellectual property), mean that the implementation of certain regional initiatives may be conditional on coordination with Federal policy. If anything, fragmentation of the innovation system is more problematic at the regional level where a 'sub-regionalism' leads to a multiplication of stakeholders in the different layers of regional governance. More positively, there has been in recent years a consolidation of smaller universities and third level institutes into larger partnerships with the major universities.

As regards the **policy priorities**, in Wallonia and the Wallonia-Brussels Federation, the Research Strategy 2011-2015 was published end 2011 as a follow-up to the willingness they had demonstrated for closer cooperation between the different policy levels (cfr. Marshall Plan2.Green). This document sets out eight strategic objectives (including reiterating the 3% objective), identifies five priority thematic areas and includes a detailed plan of action for meeting the objectives. The five thematic fields identified are: sustainable development, energy, research in technological fields, health and ageing and quality of life. Although technically a policy statement of the afore mentioned governments, an additional aim of the Strategy is to develop a joint action plan with the Brussels-Capital region. The current Regional Innovation Plan of the Brussels Capital Region (2006) covering the period 2007-2013 focuses on regional R&D strategic platforms, clusters and plans to increase regional R&D spending up to the 3% target focussing on three sectors: ICT, life sciences and environment. In 2011 the region started the preparation of a new regional RDI strategy in line with the EU 2020 strategy, in particular adopting smart specialisation priorities. In Flanders, the regional R&D strategy is based on the plan Flanders in Action (FiA), which aims at making Flanders one of the top five EU regions by 2020. Detailed goals related to research and innovation policies are set out in the Policy Letter 2010-2011. Main priorities are: (i) a focused innovation strategy, (ii) improved innovation performance in the economy, (iii) making Flanders a top region by proving it to be receptive for innovation, (iv) reinforcing science as fundamental driver of innovation and increase the intensity, efficiency and impact of R&D. In 2011, the concept note on "Flanders Innovation Centre" indicated the importance of societal challenges and identified so-called 'innovation crossroads (or hubs)' where the strengths of the Flemish innovation system meets the needs of Flemish society.

Over the last years, the **trends in the priorities of the policy-mix** in each of the three Belgian regions have tended to display some distinctive features, reflecting their specific institutional and economic environments. At the same time, a number of measures are similar in their objectives yet differ in the approach to implementation. A common feature of both the Flemish and Walloon systems is the emphasis on measures aimed at encouraging increased co-operation between the research base and enterprises. In addition, the overall efforts to structure and develop major specialised 'clusters' of R&D and innovation need to be pursued and further consolidated. The evidence from the Flemish strategic research centres suggests that it may take years before such initiatives become fully operational and realise their objectives, achieve 'critical mass' and attain international recognition. The Walloon competitiveness clusters and the research and technology centres created over the last decade will need sustained funding, regular evaluation and expert management if they are to begin to contribute effectively to structural adjustment of the economy. The realignment of research and innovation policies to contribute to

tackling the structural adjustment of the economy or for taking on ‘grand challenges’ will require better orientation and focus of the limited amounts of public funding available. There is currently limited recent evaluation evidence on the effectiveness of the measures in place and a wide-ranging review would be beneficial in each region in order to focus regional support on initiatives best able to contribute to raising the intensity of industrial R&D and innovation (including service sector and other non-technological forms of innovation).

The Belgian authorities are strongly committed to and participate in European initiatives, especially the EU Framework programme for R&D, or in related initiatives such as the ESFRI programme on research infrastructure. In a number of cases this commitment matches national challenges or priorities, for instance, the implementation of the European Partnership for Researchers in both Communities, which should make it easier to attract and retain qualified human resources. With regard to cross-border cooperation, Belgium is actively engaged in a range of European initiatives, as well as a number of federal and regional initiatives, which include bilateral agreements, joint-R&D projects and shared research infrastructures. Most instruments in innovation policy are, however, still nationally/regionally oriented and not open to cross-border or cross-regional cooperation. An interesting recent evolution is the stronger focus since 2011 on the coordination/opening of programmes between the Walloon and the Brussels-Capital regions, in parallel to the stronger coordination between Wallonia and the Wallonia-Brussels Federation.

Given the economic crisis over the last 5 years, the Belgium economy and research and innovation system appears to have ‘weathered’ the storm better than some other neighbouring countries. The introduction and extension of R&D tax reductions on researchers’ salaries may well have acted as an ‘automatic stabiliser’ without which R&D intensity would have declined rather than remaining relatively stable. Similarly, tax incentives for business may have contributed to maintaining the relative attractiveness of Belgium as a place to do research. The structuring of the higher education system should foster, if the correct policy incentives are in place, a corresponding realignment of the way research is carried out. This is one element that would help to reduce the overall fragmentation of the Belgian research system and further improve its performance. At the same time, the balance between institutional and competitive funding of the system would merit further review in order to further focus and concentrate efforts. Finally, while the remit of the Federal Government to fund ‘nation’ wide research programmes has been further limited¹, there is a clear rationale for organising joint programming, sharing certain research infrastructures or ‘pooling’ research efforts in certain fields. This has already been possible for coordinating Belgium’s participation in the research infrastructures fields of the ESFRI roadmap. It is to be hoped that the proposed Inter-Federal Plan for Research and Innovation will lead to concrete initiatives.

¹ With the decided transfer of the inter-Community programmes Inter-University Attraction Poles and Technology Attraction Poles to the Communities and the Regions

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1 INTRODUCTION

The various Belgian authorities are fully autonomous. Constitutionally there are seven Belgian authorities², in practice there are five active entities when it comes to science, technology and innovation (STI) policy as the Flemish Region and the Flemish community merged their institutions and the German community does not have a research policy (see Figure 1 in the Annex for an overview of the responsible governments and a full overview of the STI governance system).

The Federal Government has competence for the federal scientific institutes, intellectual property (IP) law, standardisation, fundamental metrology, nuclear research, corporate taxation, employment legislation and social security. The communities are competent for matters related to individuals including scientific research and (higher) education, and the Community Scientific Institutes; the regions are competent for territorial matters such as energy, environment, and economic support, thus including innovation, applied and industrial research, science parks, and technology transfer (see Ziarko, Reid & Bruno (2010) for a more detailed overview of the system).

The following ministers are responsible for research and innovation matters: the Minister for Public Enterprises, Scientific Policy and Development Cooperation at the Federal Level; the Minister in charge of the Economy, External Trade, Employment and Scientific Research in Brussels-Capital; the Minister for Innovation, Public Funding, Media and Poverty Prevention at the Flemish level. Since 2009, Wallonia and the Wallonia-Brussels Federation (previously called the French Community) have had one sole minister responsible for scientific research and infrastructures (at both levels) and the same minister responsible for higher education at the community level, and for business, external trade and new technologies at the regional level. Other ministers from either government are autonomously responsible for funding research in their specific fields of competence (agriculture, environment, energy, health).

The Federal Science Policy Office (BelSPO) coordinates federal science policy as well as specific aspects of international co-operation on behalf of the Belgian authorities (for instance, space and polar research). It is responsible for the design and implementation of research programmes and the supervision of 10 federal scientific establishments. Another actor at the federal level is the Federal Public Services (FPS) Economy, SME's, Self-employed and Energy which deals with intellectual property, standardisation, fundamental metrology, nuclear research and research regarding the continental shelf. Co-operation between the various governments takes place in the Inter-Ministerial Conference for Science Policy (CIMPS/IMCWB) and two permanent sub-committees CIS (International Co-operation) and CFS (Federal co-operation). Coordination tends to focus on practical issues such as carrying out harmonised statistical surveys and submission to the European Commission, Eurostat, OECD, etc. of statistics or policy surveys.

In Flanders, STI policy is designed and governed by the Economy, Science and Innovation (EWI) department, while various agencies implement policies. The main agencies in Flanders are IWT, responsible for innovation-related matters, and FWO for science-related matters. With regard to science, there is a certain overlap with the portfolio of the minister responsible for education and the Agency for Education and Training (AgODi). In the innovation area there is a certain linkage with the economy portfolio and the Enterprise Agency Flanders (AO) as well as the PMV agency for guarantees and loans.

² The Federal Government and the regional governments of Flanders, Wallonia, Brussels Capital, and the Flemish, French and German Communities.

In Wallonia, both industrial research funding and funding for research centres is managed by the General Directorate for Economy, Employment and Research (DGO6) of the Public Service of Wallonia. In Brussels-Capital, the INNOVIRIS agency manages subsidies for R&D and innovation for enterprises and research organisations. The main Federal stimulus to business and higher education R&D is provided through a tax credit that reduces the employers' contribution to the wage tax of R&D personnel. BELSPO also provides grant funding through targeted programmes. Funding of basic research and scientific research funding based on excellence to higher education institutions (HEIs) is provided by the two Communities' administrations: EWI in Flanders and the Directorate General for Non-Compulsory Education and Scientific Research at the Ministry of the Wallonia-Brussels Federation (DGENORS). They deliver most of these funds through two agencies, the FWO (Research Foundation Flanders) and the F.R.S.-FNRS (Scientific Research Fund of the Wallonia-Brussels Federation).

In the region of Brussels-Capital, INNOVIRIS³ (Institute for the support of Scientific Research and Innovation of Brussels) manages the implementation of research and innovation funding.

As well as providing the most funding, the business sector also performs a majority of R&D in Belgium. The other main research performers in Belgium are the HEIs (universities and university 'colleges'). There are two separate university systems, six French-speaking universities (including two in Brussels) and 21 university colleges (*hautes écoles*), and six universities and 22 university colleges ("hogescholen") in Flanders (also including Brussels). Due to the Bologna reform process, the universities have been structured into three academies (Wallonia) and five associations (Flanders)⁴. In addition to the HEIs, a core feature of the Belgian system is the existence of collective research centres, which are private initiatives in which member firms initiate, often through technical committees, topics for R&D. The 'De Groote' centres and the assimilated De Groote centres operate in all Belgian regions; the autonomous collective research centres reflect the regional mandate for S&T policy developed since the 1990s. In addition large inter-university research centres are located in Flanders, including four large strategic centres: IMEC, VITO, VIB and IBBT and two research centres are currently under development in the fields of health (CMI)⁵ and materials (SIM). In Wallonia, multi-stakeholder research platforms have been established between universities, research centres and business sectors funded by a mix of Walloon and European funds as well as by the six competitiveness clusters of Wallonia.

³ INNOVIRIS was called IRSIB/IWOIB till 2010.

⁴ Wallonia: Louvain, Wallonie-Bruxelles and Wallonie-Europe; Flanders: Leuven, Antwerpen, Gent, Hasselt, Brussels.

⁵ A virtual research centre that aims to stimulate joint translational research based on biobanks (i.e. biomedical databases, including biological samples).

2 Recent developments of the research and innovation policy and system

2.1 National economic and political context

Belgium is a densely populated federal state (11m inhabitants in 2012, 2.2% of EU-27) formed of three regions: Flanders (6.3m), Wallonia (3.6m) and Brussels-Capital (1.1m); and three language communities: Flemish (6.2m Dutch speakers), French (4.3m) and German (75k). Belgium is relatively wealthy with a gross domestic product (GDP) per capita of 119% of the EU-27 average and annual GDP growth of 1.8% in 2011. However regional differences in wealth range from Wallonia 98%, Flanders 134% to Brussels-Capital 254% of the EU-27 average in 2009⁶. The economic downturn in 2009 hit productivity, but there were quick signs of recovery. GDP per capita was €32.3k in 2008, decreased to €31.6k in 2009 and recovered to €33.7k in 2011.⁷

At the federal level, the Government Agreement of 1 December 2011 put an end to months of political instability. The document insists on the need for coordinated efforts between all regional and community entities with responsibilities in the field of research and innovation. It announces an Interfederal plan for Research and Innovation as a frame for this cooperation. The current tax incentives are maintained but will be under review.

Belgium, although not amongst the innovation leaders in the EU, is placed first in the second tier of ‘innovation followers’ (Innovation Union Scoreboard, IUS 2011) and over the last five years has achieved overall moderate growth in innovation performance (European Commission, 2010). Belgian gross domestic expenditure on research and development (GERD) increased from €600/capita in 2007 to €690/capita in 2011. Relative to GDP, GERD was 2.04% in 2011, slightly above the EU-27 average (2.03%). Public R&D expenditure is the weak link, despite increasing since 2007, at only 0.67% of GDP in 2011. Tax credits have been increasingly important since their introduction in 2004. In 2009 tax credits are slightly above €500m, adding around 0.15% of GDP to the public budgets (GBAORD).

Government intramural expenditure on R&D (GOVERD) increased from €513m in 2007 to 682m in 2011; it became more important in the governmental appropriations to R&D as it rose from 8.1% to 9.4% of total Government Budget Appropriations on R&D (GBOARD) in the same period.⁸ Business expenditure on R&D (BERD), on the other hand, is above the EU-27 average (1.37%). In relative terms, BERD accounted for 70% of GERD in 2007, and 67% in 2011. Overall, the IUS 2011 results suggest that Belgium business innovation performance and the economic effects of this activity have become weaker over the last five years (Ibid.).

In terms of human resources for research and innovation, Belgium has a relatively high and growing share of human resources in science and technology (HRST) (49.6% in 2011 – compared to 42.3% in EU-27) and researchers (Total R&D personnel) (1.24% in 2011 of the total active labour force). However, the share of new science and technology (S&T) graduates in tertiary education graduates is lower (16.3% in 2009) than the EU average (22%) and decreasing. In 2009, the geographical spread of the 59,750 full time equivalents (FTE) researchers was as follows: 61% in Flanders, 23% in Wallonia and 15% in the region of Brussels-Capital. About

⁶ Latest available year (Eurostat).

⁷ Eurostat, 2011.

⁸ BELSPO, 2011.

55% of the R&D personnel are active in the business sector (EU-27, 52%) and 36% in the higher education sector in 2009.

Belgian academic researchers are relatively productive with a share of 1.6% of the total world publication output in 2008. On average, Belgium produces 13 publications per 10,000 inhabitants, well above the EU-27 (7.4), Japanese (6.1) or even US (9.9) average. They are also internationally orientated with 54% of publications internationally co-published and with relatively high impact scores (150% of the global average). The Belgian direct citation impact is high (field normalised impact is 1.27 for 2005–08), particularly in health and agriculture (Tijssen et al., 2010).

Patenting has increased since 2000 with, in 2010, 130 patent applications per million inhabitants to the European Patent Office (EPO) and 166 to the United States Patent and Trademark Office (USPTO) (119% and 122% of the EU-27 average respectively). Chemistry, which accounts for more than 30% of applications, is the leading technological field. There are strong regional disparities in patenting from low levels in the service-oriented Brussels-Capital economy, close to the EU-27 average in Wallonia and well above in Flanders. Given this strong patenting activity there are still indications that Belgium does not fully exploit its technological strengths. The total entrepreneurial activity (TEA)⁹ is particularly low compared to innovation-driven economies in the EU (Lepoutre et al. 2010), whereas the absorptive capacity in industry is rather low due to the large share of SMEs (97.2% of Belgian companies have less than 50 employees in 2008, 0.4% have more than 200 (Union Wallonne des Entreprises, 2010). The diffusion power of the Belgian innovation system is in general considered as low, the R&D and innovation efforts have yet to bring sufficient new activities capable of ensuring economic development of the country. Even if manufacturing industries and services with high technological content have a strong importance in Belgium, such as pharmaceuticals or ICT activities, the added value is indeed rather low. Gross value-added of the industry in 2010 was 16.4%, which is below the EU-27 average (18.7%) and below the level of 2000 (22%). Furthermore if one considers the lower level in Belgium as compared to the EU-27 of the community trademarks and designs as well as the technology balance of payments flows, the R&D and innovation efforts do not seem to lead to significant economic outputs.

2.2 Funding trends

As can be seen from the table below, the recent trends in R&D expenditure in Belgium are relatively flat with both GERD and BERD remaining stable in both absolute and relative (to GDP) terms in 2009 and 2010. Both GERD and BERD are predicted to recover in 2011 (respectively to 2.04 and 1.37% of GDP), BERD remaining above the EU average (1.24%). Government budgetary appropriations for R&D in Belgium were €2,371m in 2010, a slight decrease from 2009. In percent of GDP, GBAORD remained stable to 0.67 and is below the EU average.

All Belgian authorities are committed to the 3% target, both at the federal level and the regional levels. However, although all regional authorities have succeeded to increase the absolute GBOARD; this increase is lower than GDP growth rate, so public R&D intensity is stable at around 0.7% and is even predicted to decrease in 2011. As is recognised by Belgian authorities (see BELSPO 2010b), it will be hard to meet the 3% target, especially if business investment weakens further. In 2011, the Government of Flanders invested €65m of additional resources in

⁹ The total entrepreneurial activity (TEA) index indicates the percentage of labour force actively involved in setting up a new business, or being the owner/manager of a company less than 42 months old.

R&D, and furthermore an additional €97m of payment resources were allocated for commitments in the past for IWT projects (the Agency for Innovation by Science and Technology). Moreover, it also approved a growth path for the R&D investments during the period 2012-2014. The budget will increase cumulatively after 2011: €60m extra in 2012, €70m extra in 2013 and another €70m extra in 2014. As a result, the budget for innovation in 2014 will amount to €200m more than in 2011.

	2009	2010	2011	2012 (estimate, if such data are available)	2020 national target	EU average 2011
GDP growth rate	-2.8	2.4	1.8	na		1.5
GERD as % of GDP	2.03	2.01	2.04 p	na	3%	2.03 p
GBAORD (€ million)	2,285.00	2,370.89	2,321.7 p	na		87,508 s
GBAORD as % of GDP	0.67	0.67	0.63 p	na		0.73 s
BERD (€ million)	4,574.77	4,730.00	5,072.5 p	na		159,975.94 s
BERD as % of GDP	1.34	1.33	1.37 p	na		1.26 s
R&D performed by HEIs (% of GERD)	23.79	23.55	22.86 p	na		23.99 s
R&D performed by PROs (% of GERD)	8.94	9.23	9.03 p	na		12.68 s
R&D performed by Business Enterprise sector (% of GERD)	66.26	66.24	67.13 p	na		62.35 s

According to the Federal Office for Science Policy, direct support for universities represented 24% (€2,344m) of the total Belgian public funding for R&D in 2008, funding for scientific institutions 14% and project based funding 11%. The latter is allocated to universities via the research funding agencies. Apart from these mechanisms, 18% of funding is through research action programmes, which are open to public research and/or private research agencies and include individual grants for researchers. Some 11% of the total funding is channelled to industrial research. Finally 15% of the government budget is dedicated to the participation in international research programmes (mainly space). Additional competitive funding is channelled through the two main research funds (FWO-Flanders and F.R.S.-FNRS).

Academic funding is allocated primarily on the basis of the number of students and full-time equivalent researchers. In Flanders, a share of the funding for each university is also distributed based on an allocation key (the so-called BOF key). An insufficient share of competitive funding for universities is an impediment to excellence in knowledge production (Verbeek, 2007).

High tax burdens and high labour costs remain a negative element for private parties to conduct research in Belgium. The wage and social security taxes that employers pay for their employees are amongst the highest in Europe; and take-home pay of qualified employees is lower than in competing countries. In order to counteract these disadvantages, Federal tax incentives for R&D were launched in 2003. Belgium provides next to tax credits additional fiscal incentives through reductions in R&D workers' wage taxes and social security contributions.

As of 2007, part of the social security contributions paid by public research institutions (about €31m in 2007) were reimbursed to the two community funds for scientific research (F.R.S.-FNRS, FWO) in order to create new research mandates.

The Government Agreement of December 2011 maintains the existing fiscal policies of tax incentives and tax deductions for R&D. This includes the exemption from payment of withholding tax for researchers, investment allowances, exemptions from regional bonuses granted to companies for research investments, deductions for income from patents, the "Young Innovative Companies" and the deductions for donations. However, federal indirect R&D

subsidies of researchers will be under review according to the Government Agreement 2011. According to the OECD (2010), Belgium ranked 5th in terms of indirect (tax) subsidies in 2007 with €177.4m, and the federal tax R&D subsidies have increased to €460m in 2009. The total revenue foregone due to the R&D tax subsidy nearly doubles the share of the Federal Government in total public R&D funding.

While the main research and innovation funding measures at regional/community level tend to be of a horizontal nature, there has been a gradual shift to targeting a share of available funding towards specific sectors. At Federal level, this is clearest in terms of the focus on sustainable development, polar research and space research. At regional level, a number of specific measures or the setting up of thematic research centres or clusters have been a clear policy orientation. In Flanders, this has been done through the establishment of the four strategic research centres microelectronics (IMEC), environment (VITO), biotechnology (VIB) broadband technologies (IBBT), and two new knowledge centres on materials (SIM) and health (CMI); in Wallonia through the thematic competitiveness clusters, the mobilising programmes and more recently the programme for public-private partnerships and the WELBIO institute (in addition to the thematic applied research centres supported by the region); and in Brussels-Capital Region, a thematic focus is put on ICT, environment, and life sciences. While both Flemish and Walloon regions aim to foster public-partnerships, the success of their respective measures is somewhat below expectations. The new Concept Note Innovation Centre Flanders aims at integrating the different excellence centres into the six defined innovation Crossroads. For the Walloon competitiveness poles, mid-term evaluations for five clusters were provided for 2010 and they all provided positive but also several negative observations including lack of strategy, insufficient communication or lack of private funding.

Funding from the European level is an important source of research funding in Belgium, for instance, under FP6, Belgian researchers secured funding of close to €700m. From the total Structural Funds for Belgium over 2007-13 (€2,258b), Wallonia receives 61%, Flanders 32% and Brussels-Capital 4%. ERDF means will be spent on sustaining regional competitiveness and strengthening territorial cohesion (Brussels); promoting the science and innovation economy, stimulating entrepreneurship, improving the attraction for foreign companies and on urban development (Flanders); creation of companies and employment, development of human capital, sciences and research, and sustainable development of the region (Wallonia). In Wallonia, the total amount dedicated to research activities for the period 2007-13 represents €250m (ERDF plus contribution from the Walloon Region), which is an increase of 30% in comparison to the previous period (25% of these funds are dedicated to SMEs). One issue clearly for Wallonia, more than the two other regions, will be the impact of a reduction in total Structural Funds resources post-2013 on public research funding.

Another important source is FDI. Belgium has a strong presence of large foreign subsidiaries in the country: FDI intensity in Belgium increased from 5.7% in 2002 to 20.4% of GDP in 2008. Many of them operate also large R&D departments in Belgium; the share of industrial R&D by foreign owned firms is close to 60%.

2.3 New policy measures

Walloon region

The Walloon region launched in the context of the Joint Research Strategy for Wallonia and the Federation of Wallonia-Brussels in 2011 a Collective research call which has been running in

2012 and there is now a new opening phase for 2013. The main goal of the project is to strengthen the expertise and know-how of research centres in fields that would fulfil the needs of SMEs. So as to foster a collaborative spirit, collaboration with a university unit is compulsory for this call. Projects should be oriented towards a specific industrial need and have a measurable impact on the economy. The projects will have a maximum duration of two years.

Collective research, at the regional, national or international level is one of the main priorities for research in Wallonia. Projects submitted in this programme will be part of the concept of collective research. Collective research aims at reaching and benefiting to a maximum possible number of SMEs. A search Collective research is usually initiated by groups of companies with technical and economic needs in common and carried out by specialised research institutes or technology centres in a given industrial field. It is a generic type of research, more than in contractual research or collaborative research for instance where some programmes are specifically designed.

There is an important international dimension to collective research in Wallonia as it perpetuates the ERA-NET CORNET programme of the European Union. Although funding for the CORNET II programme by the European Commission has ended 31 December 2010, Wallonia continues to participate in CORNET with six other countries.

In 2012, the Walloon region set a Public-Private Partnerships (PPP) for breakthrough innovation. The public-private partnership for R&D aims to federate the financial resources of the Walloon Region with those of a company and a research institution to meet the requirements of a technological breakthrough in a given sector of activity. This type of action supports university level research programmes in partnership with private companies. The project should focus on acquiring new scientific and technological knowledge needed for the development of products, processes or services of the industry concerned. The subsidised research activities particularly relate to the strategic field of the partner companies. The private partner, in return, gets priority access to research results based on the specific agreements. Hence, the derived results are likely to be exploited by the co-financing company.

In practice, the programme provides funding for research in apportioning costs between the Walloon Region that supports half the budget, the company covering the quarter and the research institution providing the balance. The projects are concluded for a term of two years, possibly renewable.

The eligible expenses covered by the Walloon Public Service are:

- Staff expenses related to researchers, technicians and other supporting staff, provided they are assigned to the project;
- Costs of the instruments and equipment used for the project;
- Additional overheads directly incurred by the project;
- Other operating costs, inter alia, the costs of the materials, supplies and similar products, directly incurred by the project.

The eligible expenses covered by the industrial partner are the direct defraying of the expenses incurred or the recruitment of staff or the defraying of the purchase of equipment, i.e. a defraying of certain expenses directly incurred within the research institution.

The 2012 call represents a total budget of €6m.

Through the support of public-private partnerships for oriented university level research, the regional authorities aim at fostering the cooperation of public and private actors around strategic areas for the development of the Walloon region. Business is the main driver of knowledge

demand in Belgium: although slightly decreasing, in 2008, more than two-thirds of research (69%) was performed in the business sector (EU27: 63.9%); and 21.2% in the higher education sector (EU27: 22.4%). Universities of the Wallonia-Brussels Federation have developed areas of excellence for which the potential for technology transfer is high. Whether through the creation of new industrial activities or through the development of existing sectors, these areas may generate a strong value added for the regional economy.

This initiative goes along with other recent initiatives supporting collaborations between Walloon universities, research centres and enterprises (programmes of excellence, clusters or competitiveness poles). The objectives of all these Walloon measures are the networking and the reinforcement of synergies in order to increase the critical mass of Wallonia and to reach an international competitiveness and visibility.

The main policy priority set under the measure is to encourage Public-Private partnerships to foster innovation.

Federation Wallonia-Brussels

The call is also echoing the common Research Strategy adopted by the Walloon Government and the government of the Federation of Wallonia-Brussels in 2011 to foster integrated approaches to R&D and innovation. The thematics set for the call are also similar to the priorities set in the common research strategy, that is to say:

- Sustainable Development
- Energy
- Research in technological fields
- Health
- Duration and Quality of Life
- Foster collective research and integrated approaches to research.

Flemish region

The ARKImedes Fund is a public initiative, managed by a Flemish Holding Company. The ARKImedes fund is, with fiscal incentives, attracting investments (shares or bonds) from private persons in Flanders. These investments are put into a fund that invests in private Venture Capital Funds with a professional management and successful track record. The ARKImedes funds invest their money in accredited risk capital providers, the so-called ARKIVs. These are private risk capital funds that have been accredited by ARKImedes Management NV. The ARKImedes investment in a fund is 50%. These funds (the so-called ARKIV's) invest in start-ups and expansion of SMEs in Flanders. The investment of an ARKIV is always smaller than €1m, and is not influenced by the ARKImedes fund. The ARKImedes fund does not interfere with the decision process of the ARKIV to invest in a company: ARKIVs have full power of decision.

To obtain an accreditation, an ARKIV must demonstrate, among other things, that it has a professional management team and that it has already provided successful services in procuring venture capital for businesses.

The first, ARKImedes-Fonds NV, was established on 8 June 2005 by ARKImedes Management NV (a 100% subsidiary of ParticipatieMaatschappij Vlaanderen NV). The fund has a fund size of EUR €111.1m.

On 4 June 2010 a second fund, ARKImedes-Fonds II NV, was established. This has a fund size of €100m, and will invest in new ARKIVs from 2011. The accreditation procedure for the new ARKIVs started in September 2010.

The need for innovation in an international competitive environment cannot be facilitated with company R&D programmes only. In the Competence Pole programme launched by the Flemish government in 2012, 'open innovation' is a key concept. Because innovation is a non-linear multi-actor process, the Competence Poles aim at facilitating co-operation and interaction between the relevant actors from science, technology and the industry. Ultimate goal of the Poles is to create and diffuse knowledge creation and knowledge diffusion between industry and knowledge institutes. The goals of the competence poles can be summarised as follows:

- Better alignment and more intensive co-operation of a variety of actors (industry, intermediaries, academia);
- Increasing the innovative capacity of the target group, thus increasing its competitiveness;
- Increasing the competence of Flanders;
- More efficient use of means;
- Development of a long term strategies.

The individual Competence Poles are bottom-up initiatives from the industry. In the competence poles, industrial parties cooperate with research institutes in research and transfer projects. The competence poles thus strive for problem-driven, open and collective R&D activities. The competence poles are part of the Flanders: Flemish Cooperative Innovation Networks-plan of the government, initiated in 2006. In 2010 there were 8 different competence poles, each of which having a specific focus. Most of the competence poles have a thematic approach such as mobility, materials etc., however, Flanders DC aims at stimulating entrepreneurial creativity.

The competence poles have started in 2006, since then the budget has been increased. In the beginning of 2009, the first competence poles were through their time of existence. In that year 4 new poles started. In 2010 another competence pole was set up. The ninth competence pole started in 2012. In 2010 the Flemish government decided to implement 'light structures' for the competence poles. The implications of this are, for example, that the poles do not receive a structural budget, but are required to apply for this budget with concrete project proposals.

The need for more innovation in Flanders within an international competitive context cannot be supported adequately by individual R&D projects of companies alone, or by smaller collective projects. There is a need for 'knowledge pedestals' with a collective dimension for broad Flemish industrial segments. These 'knowledge pedestals' must provide the innovation potential for specific sectors and must build on already existing competences in Flanders. Three types of innovation needs are present:

- the need for cooperative strategic basic research in order to develop knowledge platforms, on which individual companies can find their R&D;
- the need for collective research and knowledge diffusion, esp. in sectors mainly consisting of SMEs;
- the need for large research and testing facilities that are not viable for individual companies.

In order to support these needs, the Flemish Government has in the past founded large research centres (IMEC, VITO, VIB and more recently IBBT) and, since the late nineties a series of somewhat smaller initiatives (e.g. VIL (Flemish Logistics Institute), Flanders' DRive (Centre for the Automotive Industry), Flamac (Flanders Material Centre)). All these institutes were more or less started on ad-hoc basis. In 2005 a policy framework was developed for the support of these centres. Financial support for the competence centres will be provided through the VIS programme (policy measure BE 56). The four research institutes (IMEC, VIB, VITO and IBBT) are financed separately (IBBT by IWT, the others directly by EWI of the Flemish government).

Concluding, without government support collective /cooperative research activities do not take place, although they have a strategic importance for the Flemish society and economy in order to create/maintain a sound knowledge base for innovation where individual companies tend to become more and more short term oriented.

Competence Poles are initiatives that bring different actors (industry, researchers etc.) together, thus facilitating knowledge transfer and boosting innovativeness.

Federal government

Through fiscal incentives the government mobilises private capital of individuals. This capital is then used for matching private venture capital. In this way the available VC is doubled with limited costs for the government.

At Federal level, BELSPO and the Minister for Science Policy agreed (in July 2012) on a management agreement defining roles and commitments of the Minister for Science Policy and the Office for Science Policy (BELSPO). This agreement also defines and specifies respective missions and resources allocated to do so. The latest management agreement between the Minister for Science Policy and BELSPO covers the period from 2012 to 2015.

The objectives of this agreement are to:

- Ensure the proper execution of tasks assigned to BELSPO;
- Ensure the consideration of government expectations;
- Encourage a drive for modernisation and professionalization of management of BELSPO;
- Increase transparency and efficiency of operation of BELSPO;
- Provide a basis for discussion regarding management and finance of BELSPO.

These objectives are translated into concrete action plans described in the management agreement and regarding reform and reorganisation of structures or programmes, in the wider context of the Horizon 2020 EU framework programme. The aim is to reinforce BELSPO as a key stakeholder and backbone of the research landscape in Belgium, as well as increasing coherence and interactions between different levels of responsibility, in a more "client-oriented" approach.

To do so, this management agreement integrates strategic commitments and as well as operational commitments regarding reorganisation and restructuring of BELSPO, management of collections and heritage, scientific research and expertise, modernisation of services to users, communication and promotion, management of BELSPO.

This management agreement should be replaced in the wider context of reform and modernisation to better foster R&D and innovation and support research policies. The 2010 BRISTI report analysed the levels of responsibility in science and technology (STI) policies and the role of the federal level. The strategic part and the development of instruments part of it are very important and reflected in the recent Management Agreement. The role of BELSPO is also to coordinate all policies at different levels. STI policies are mainly implemented by BELSPO and concern financing of R&D activities, support for R&D activities and R&D policy and performing research. According to the report, even with the effects of decentralisation, it still is a very important body for STI policies support but problems linked to governance might rise. Efforts have been made at different levels to enhance the effectiveness of governance of research and innovation policies (strategies, target setting, broad-based partnerships, evaluation), that the given Management Agreement is one of the tools used to do so.

Objectives of BELSPO, as recalled in the Belgian Report on Science, Technology and Innovation (BRISTI) report, are to:

- Fund research carried out at universities, research centres and federal scientific institutions;
- Undertake scientific research in a number of fields (space, climate, biodiversity, art history, ethnology, geology, archival science, library science) through its scientific institutions;
- Coordinate research activities at an international and inter-federal level;
- Manage and study scientific and cultural heritage, of an estimated value of €6.5 billion.

Internationalisation (mobility of researchers, international cooperation, etc...) is also an increasing matter of interest for BELSPO.

Several projects are detailed under operational commitments. Indicators, qualitative and quantitative, used to measure performance and success, are project specific. As there are 60 projects in total, some of them might have common performance indicators. For example, if we take the implementation of the environmental management system (or EMAS), what is expected is a 7.5% reduction of energy bills including water, 10% reduction of paper consumption, 10% of waste reduction, 5% increase in sustainable mobility, 15% increase sustainable public procurement.

The main policy priorities set are to enable better allocation of tasks and missions and reform management practices to foster efficiency of the organisation.

Region of Brussels-Capital

Run by INNOVIRIS, the Brussels Institute for Research and Innovation, for the Region of Brussels-Capital, the scheme 'Young Innovative Companies' targets companies at their growth stage. Companies selected are entitled to financial help and support for the execution of their strategic innovation plan (PSI), for a maximum of three years and for a maximum of €300,000.

Companies eligible to participate to the programme should:

- Be either a small or medium-sized enterprise (definition based on the recommendation 2003/361/CE);
- Be less than 6 years-old;
- Develop its activities on the regional territory;
- Provide an evaluation performed by an external and independent expert, proving that they aim at developing innovative products or processes and that presenting a risk of a technological or industrial failure;

- Companies should prove they spend 15% of the total company spending on R&D (for one of the last three years).

This support measure is part of an overall effort by the Brussels-Capital region to stimulate the number of new 'high-tech' or knowledge intensive firms being created and growing in the region. The region is home to a significant research potential notably academic around the Free University of Brussels (ULB). Nonetheless, the Regional Innovation Plan 2007-2013 highlighted a number of weaknesses notably the very low level of R&D expenditure in enterprises. This situation still prevails now that the update of this Regional Innovation Plan has been adopted in 2012.

This specific scheme has been set up so as to support innovative companies at their growth stage.

This support measure main priority is to support the growth of young innovative companies so as to increase competitiveness of the economy and foster creativity.

2.4 Recent policy documents

All authorities commit to the target of 3% of GDP invested in R&D (2% coming from the private sector and 1% from the public sector). This is reflected in the policy documents relevant for R&D policy of all entities (Marshall Plan 2.Green 2010-2014 in Wallonia, Brussels Regional Innovation Plan 2007-2013, Flemish Policy Note 2009-2014 on Scientific Research and Innovation, Declarations of regional and community policies in Wallonia, the French Community and Flanders (2009)). The Government Agreement of 1 December 2011 suggests an “inter-federal plan for research and innovation” to coordinate efforts of all entities towards this objective.

According to the National Research Plan (NRP) for Belgium for 2008-2010 and its 2009 implementation report, to comply with the European objective of allocating 3% of GDP to R&D, ‘the public authorities will make a greater effort to bring their R&D expenditure to 1% of GDP. For their part, companies will strive to better convert their R&D expenditure into innovations that can be brought to the market place’. All regional governments committed themselves to take further steps to aspire to the 3% rule and it is recalled in the Federal agreement of 1 December 2011.

Within its fields of competence, the Federal Government committed itself to supporting activities of the European Space Agency, polar research (notably at the Belgian polar base) as well as basic research, notably through the inter-university attraction poles. Apart from this, scientific research on renewable energies as well as activities of the research centre on nuclear energy (SCK-CEN) on the reduction of the life-cycle of nuclear products and of the National Institute of Radio-elements (IRE) on medical isotopes should gain federal support as well.

Following the regional elections of June 2009, the new Flemish government has made implementation of the renewed Flanders in Action (ViA) plan the central theme for its term. This action plan should lead Flanders to reach the top five of excelling regions in Europe in terms of economic performance and ‘be a nice place to live’. At the core of the ViA is the Vilvoorde Pact, as well as a new agreement between the social partners to boost innovation, the Pact 2020, which pursues several goals related to research policy, such as: Devote 3% of GDP to R&D by 2014;

- Boost creativity and innovative capacity, for instance by increasingly involving the non-academic higher education institutes in innovation projects;
- Put more focus on 'spearheads', i.e. innovation policy focused on themes where Flanders has a strong knowledge position and good economic prospects;
- Give more attention to output of research policy;
- Stimulate students to study sciences, and give researchers better prospects;
- Increase investments in higher education institutions up to 2% of GDP.

The Policy Note 2009-2014 on Scientific Research and Innovation draws up the long-term plan for the 'Open Innovation Centre Flanders' and addresses the following main issues:

- Economic exploitation of research results through creativity and innovative entrepreneurship;
- Focus on 'grand projects', 'thematic spear heads' and economic clusters in the Flemish economy and innovation system; and
- Flanders as an international player: strengthening basic research, human potential in research, research infrastructure and a more output driven research policy.

On most topics, the policy note is a continuation of the policy plans of the previous Ministers: simplification and efficiency of the current set of STI policy instruments is still on the agenda. Main changes in this Policy Note when compared to the previous Policy Letter (2009) are the explicit preference for light (often virtual) instruments, the focus on 'grand projects' and the widening of the definition of innovation.

The long-term policies of the ministers are updated on a yearly base. The Policy Letter 2010-2011 showed no significant changes from the Policy Letter 2009-2014. The 2011-2012 Policy Letter for Science and Innovation contains more policy goals. These include the introduction of six so-called Innovation Crossroads. These are: Transformation through Innovation; Eco-Innovation; Green Energy; Innovation and Care; Sustainable Mobility; and Social Innovation.

Following the regional elections, the formation of the Walloon and French Community governments was based on a common political strategy. The socio-economic priorities of this strategy have been translated into an operational plan called the Marshall Plan 2.Green (Plan Marshall 2.Vert), which endorses the 3% Objective. In summary, it aims to improve competitiveness of firms by improving the performance and integration of research with industry. This plan, which has been allocated a budget of €1.6b over five years (2009-2014), is a continuation and a reinforcement of the previous plan implemented during the period 2006-2009. The addition of 'Green' underlines the new orientations to better integrate 'sustainable development' as a crosscutting priority. The third priority area of the new plan 'Strengthen scientific research as an engine of the future' incorporates the main actions to be pursued as regards STI policy. Funds from both authorities will be invested in the implementation of a joint research strategy, which also involves the Brussels-Capital Region, and focuses on strategic crosscutting themes, e.g. sustainable development, renewable energy, new technologies, longer life, etc. Additionally, the authorities intend to pursue the efforts undertaken since 2005:

- Reinforcing investment in basic research by the French community through the implementation of the second development plan of the National Scientific Research Fund (FRS-FNRS);
- The continuation of STI programmes started within the first Walloon Marshall Plan: programmes of excellence, mobilising programmes, support of research projects of competitiveness poles, research commercialisation through the creation of spin-offs;

- A continued support to partnerships between university academics and between research actors and industry.

Both authorities also intend to work together to offer an attractive career to researchers, better integrate French-speaking researchers in international networks, reinforce activities for science awareness in order to encourage young people to pursue scientific and technical careers and implement a technology assessment process as a tool for decision-making in various areas of public action. Other measures, forming part of the priority areas 2 and 6 of the Marshall Plan 2.Green, aim at supporting research and innovation in the specific field of the environment with the creation of a 6th competitiveness cluster dedicated to 'green' technologies, the creation of a centre of excellence in the field of sustainable development and funding of research programmes in areas such as renewable energy, sustainable construction and smart technologies for the management of the electricity network.

The region of Brussels-Capital has adopted its first Regional Innovation Plan in 2006 that covers the period 2007-2013. The objective is to increase the regional R&D capacities by focusing efforts on three promising sectors: ICT, health and environment. The strategy has not evolved since then but the ordinance of 26 March 2009 for supporting research, development and innovation is the new legal basis of the region for R&D and innovation policy.

2.5 Research and innovation system changes

In December 2011, a new Federal Government was finally sworn in after 541 days of negotiations. The government agreement sets out a range of measures to tackle the financial crisis and contains a number of austerity measures. In the field of R&D, major cutbacks are not planned; however, the indirect R&D tax subsidies will be under review. The Federal Government's Coalition agreement points to a need for more coordination between the communities, the regions and the Federal Government in order to achieve the 3% target. The aim is to develop an inter-federal plan for research and innovation. Noteworthy though is the plan to terminate the federally-organised and supported inter-university 'attraction poles' as of 2017. These poles are one of the very few initiatives fostering collaboration in basic research between the North and the South of the country.

While the remit of the Federal Government to fund 'nation' wide research programmes has been further diminished (with the decided transfer of the inter-Community programmes Inter-University Attraction Poles and Technology Attraction Poles to the Communities and the Regions), there is a clear (financial at a minimum) rationale for organising joint programming, sharing certain research infrastructures or 'pooling' research efforts (e.g. the Scottish example of research pools could be applied) between Flemish, Brussels, Walloon and Wallonia-Brussels based research teams in certain fields. This has already been possible for coordinating Belgium's participation into research infrastructures of the ESFRI roadmap. It is to be hoped that the proposed Inter-Federal Plan for Research and Innovation will lead to concrete initiatives.

Due to the Bologna reform process, the universities have been structured into three academies (Wallonia) and five associations (Flanders). The structuring of the higher education system (in both Communities) into larger institutions ('associations' or 'academies' bringing together several third level education institutes) should foster, if the correct policy incentives are in place, a corresponding realignment of research potential (e.g. greater scope for inter-disciplinary work or merging or pooling of research teams across formally autonomous institutes). This is one

element that would help to reduce fragmentation of the overall Belgian research system and further improve its performance. At the same time, the balance between institutional and competitive funding of the system would merit further review in order to further focus and concentrate efforts.

The Wallonia-Brussels Partnership for Researchers was adopted in 2011. It is the contribution of the Wallonia-Brussels Federation to the implementation of the European Charter for Researchers, the European Code of Conduct, the European Commission Partnership for Researchers, the recommendations of the Helsinki Group on Women and Science and the human resources strategy of the “Innovation Union” of the European Union. It is worked out in twenty-five actions divided into six chapters, where public authorities undertake, alongside the actors in research, to place researchers at the centre of the priorities given to the consolidation of research as a driver of the future.

2.6 Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3)

It should be noted that many of the regional aspects are covered in other sections, due to the specificities of the Belgian research and innovation system. e.g. there are explicit regional smart specialisation strategies, as described before, even if they are not labelled explicitly that way.

A comparative study of sectoral strengths in science, technology and economy, the so-called “specialisation profiles”, was performed within the smart specialisation study of the OECD Working Group on Innovation and Technology Policy (ECOOM & EWI department, 2011). This study analysed the relative performance of Belgium, focusing on scientific development (based on the analysis of publications¹⁰), technology development (based on patent analysis) and economic development (based on labour market data). Belgium has a relatively high activity compared to the reference countries¹¹ in the major science fields of: biology, clinical and experimental medicine and neuroscience and behaviour. The top three technology specialisation profiles, with the highest share of patents, are: macromolecular chemistry & polymers, textile & paper machinery and other special machinery. The top three economic specialisations are manufacture of chemicals & chemical products, post & telecoms and manufacture of basic materials. The analysis highlights a mismatch between knowledge production and the technological and economic fabric of the country and more particularly in the Southern part of the country (Capron and Cincera, 2002), as the strengths in science do not correspond with the technological and economical strengths.

Belgium focuses on key enabling technologies as well as on specific sectors. Flanders increased its focus on the set-up of cluster initiatives and Strategic Research Centres. In December 2011 after an evaluation, the Management Agreements of three Strategic Research Centres were revised and new ones signed for five years, and in 2010 the Strategic Initiative Materials (SIM) and CMI were launched. The basic ambition is to strengthen the economic position of Flemish industry in Flanders in the medium-to-long-term, by executing and transferring accumulated knowledge through strategic research. End 2011 the Flanders Innovation Hub for Sustainable

¹⁰ Analysis of the so-called Activity Index.

¹¹ Australia, Austria, Czech Republic, Finland, Germany, Netherlands, Poland, South Korea, Spain, Sweden, Turkey and the UK.

Chemistry (FISCH) excellence centre was established on sustainable chemistry. Wallonia puts a stronger focus on environmental issues. Following the adoption of the Marshall Plan 2; Green in 2009, specific initiatives were launched in the field of the environment with the creation of a 6th competitiveness pole dedicated to green technologies in 2011 (GreenWin). Brussels Capital region has launched in 2010 its first ICT strategic platform followed by the strategic platforms in Health: Expertise platform specialised in the toxicology of nano materials (NANO- IRIS) and platform for clinical research common to the three hospitals in Brussels (CLINiCOBRU). In 2012 this programme will be extended to the environment sector (renovation of buildings) and a new strategic platform will be set up in this sector.

2.7 Evaluations, consultations

Evaluation of research and innovation policy is not a systematic practice but all the authorities seek to evaluate specific measures or initiatives or organisations on a periodic basis. For example, in 2011, according to its management contract, the Walloon Technology Promotion Agency ([AST](#)) was evaluated¹² and Wallonia invited the OECD to review its regional innovation system (results not yet available).

Regarding the Walloon “Marshall Plan 2.Green”, all measures implemented are subject to monitoring by a unit especially set up for this purpose within the General Secretariat of the Public Service of Wallonia and a program of thematic assessments currently in progress was defined by the Walloon government.

The same applies to the programs co-financed by Structural Funds. A thematic evaluation of actions for development and exploitation of innovation potential was carried out in 2012.

The implementation of a strategic approach for the management of programs to support RDI was introduced in the legal texts in 2008 (Decree of 3 July 2008 to support Research, Development and Innovation). This initiative has become concrete with the adoption of the Strategy for an integrated research 2011-2015. This Decree provides for an external evaluation of the implementation of this strategy at the end of five years of its implementation as well as the organization of a systematic collection of data on the outcomes and impacts of all projects financed under the Decree. This data collection was implemented in the 2012.

In Flanders, the EWI department set up a dedicated unit for policy monitoring and evaluation in 2009. The influential 2007 Soete review, which recommended simplification and a more “customer friendly set of instruments in Flanders”, is currently being updated. Evaluation needs are defined in the programming documents of specific measures and performance indicators are set out in the management agreement for implementing organisations with the Government, which enables a clear and transparent evaluation process. Evaluations at programme level are often assigned to external experts. These are usually published in a complete or summarised version or are available on demand.

In the Brussels Capital Region, even if evaluation practices have been up to very recently very limited, during the preparation of the updated R&D strategy in 2011, the regional R&D system has been assessed (financing, governance, policy mix). At the same time, the region has elaborated a “R&D scoreboard” a tool which should allow monitoring the regional R&D policy at programme and projects level. Furthermore it is planned that Innoviris will set up a specific

¹² Evaluation performed by Technopolis Group & ADE, 2011: Associated to a lack of public support, it came out that the lack of proper intervention tools does not allow it to influence its network and that it mainly relies on bottom-up approaches based on the collaboration of the operators (with a diverse success rate). The role, missions and methods of the AST remain unclear after four years of operation.

unit dedicated to the task of monitoring R&D evolution in the region and ensuring a “strategic R&D intelligence”.

With regard to the quality of research institutions, the quality is often hard to appraise as they are not yet systematically evaluated and monitored at federal level neither in Wallonia nor in Brussels. In Flanders, an evaluation culture has been emerging strongly in the last decade, e.g. all Strategic Research Centres have been evaluated in the last five years. The quality of research at HEIs is under pressure in Belgium, as in several other EU countries, due to the strong increase of students while funding is lagging behind this trend. In addition, Belgium has only limited competitive funding at HEIs - which might offer a further stimulus to enhancing the quality of research.

Belgium has quite a number of Public-Private partnerships (notably competence poles in Flanders, competitiveness poles in Wallonia). Many of these initiatives have not been subject to an external evaluation, or the results were not made public, which makes evidence-based assessment of these initiatives hard. However, in Flanders the instrument has recently been subject to change: competence poles are now ‘light structures’, which should enhance synergies between public and private partners and enable more transparent governance. In this light, the performance of the new competence pole is measured via Key Performance Indicators (KPIs) and funding depends on these KPIs. A final challenge remaining may be the integration and search for synergies at Belgium level, as competence poles have a relatively high regional character. Particularly noteworthy is the recent opening of Walloon competitiveness poles to Brussels stakeholders.

3 Structural challenges facing the national system

Belgium is ranked fifth in the EU-27 by the 2011 Innovation Union Scoreboard and is amongst the group of “innovation followers” (first before the UK). There remain a number of challenges including an overall governance challenge and three main structural challenges. The latter differ in intensity between the regions.

Innovation performance of Belgium (Indicator values relative to the EU27 =100)

HUMAN RESOURCES	
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	93
Percentage population aged 25-64 having completed tertiary education	132
Open, excellent and attractive research systems	
International scientific co-publications per million population	389
Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	125
Finance and support	
R&D expenditure in the public sector as % of GDP	86
FIRM ACTIVITIES	
R&D expenditure in the business sector as % of GDP	107
Linkages & entrepreneurship	
Public-private co-publications per million population	170
Intellectual assets	
PCT patents applications per billion GDP (in PPS€)	91
PCT patents applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	99
OUTPUTS	
Economic effects	
Medium and high-tech product exports as % total product exports	100
Knowledge-intensive services exports as % total service exports	86
License and patent revenues from abroad as % of GDP	92

Source: Innovation Union Scoreboard (2011)

Challenge 1: Increasing co-ordination and synergies within the governance system

The multi-level governance of the Belgian system creates specific challenges (Boekholt & Georghiou, 2011) such as a risk of sub-optimal scale of public-private investments that may create disincentives for co-operation between the main research performers and businesses at an inter-regional level. Given the trend to further empowerment of the communities and the regions, policy making in scientific research and innovation happens essentially at community and regional level, but several important policy areas that influence the effectiveness of research and innovation policies, such as the tax system, remain at the Federal level. While co-operation and coordination mechanisms exist essentially at operational level regarding international issues, co-operation and coordination regarding national issues is much more sporadic. Co-ordination happens through bodies like the CIS (dealing with research and innovation) and the International Economic Commission (IEC) (dealing mainly with the economy and non-research related innovation). Intra-regional co-operation is increasing with neighbouring countries (for example, the Leuven-Aachen-Eindhoven triangle). At the same time, the devolution of research and innovation policy competences to the communities and regions enables each community and region to pursue diversified strategies that respond to specific socio-economic challenges or to further boost specialisations. The newly installed Federal government acknowledges such advantages of regionalisation while seeking to limit any ‘negative externalities’ by proposing, in the Government Agreement that *“there should be an inter-federal plan for research and innovation”* that

“will make technological innovation more efficient”, “while respecting each entities’ competences” (Belgian Federal Government, 2011).

The issue of fragmentation also exists at regional level with several studies in both Flanders and Wallonia pointing to the drawbacks of sub-regionalism and an institutionally heavy system of intermediaries and sub-critical research centres. Initiatives such as the strategic research centres and excellence centres in Flanders and the Competitiveness Poles in Wallonia are an attempt to structure the R&D capacity in specific fields and sectors. However, a rationalisation of intermediary structures and a centralisation and professionalisation of business advisory networks and financing structures would provide more cost-effective support to business innovation.

Challenge 2: Under-financing of research

Relatively speaking, the Belgian innovation system is under-financing research (Boekholt & Georghiou, 2011) with R&D intensity below the EU average. The challenge is twofold: to increase public funding for R&D faster than the increase of GDP, and to leverage renewed growth of business expenditures on R&D.

Despite an absolute growth, Belgian public expenditure on R&D as share of GDP remains lower than the EU-27 average (0.67% in 2011 in Belgium, against 0.77% in the EU-27. Public sector investment is particularly low in Wallonia (0.54%), whereas levels in the region of Brussels-Capital (0.75%) and Flanders (0.73%) are closer to the EU-27 average. As Belgium has a high level of public debt (97.8% of GDP in 2011), the pressure to reduce public deficits in response to the financial crisis will limit the room for manoeuvre for a sustained increase of public investment in R&D. Both Brussels-Capital and Wallonia will struggle to maintain investment levels in R&D, as co-financing from the Structural Funds will begin to fall post-2013 (Walloon Council for Science Policy, 2010). It is noteworthy though that R&D tax credits play an important role in public efforts for supporting research, representing approximately €500m in 2010 (28% going to HEI and research funds, 12% to scientific organisations and 60% to enterprises, according to BELSPO data). These efforts are nonetheless not included in the 3% target calculations.

At the same time, business investment in R&D has been declining, in both absolute and relative terms and business R&D is concentrated in a few hundred companies (BELSPO 2010). In 2009, 88% of BERD was performed by companies with more than 50 employees (and 43% with more than 1000 employees, up to 56% in Wallonia) and 9.8% of BERD was financed by capital from abroad. The role of foreign owned firms in the Belgian economy is significant (Belgium is fifth in the world in terms of foreign direct investment (FDI) stock) with 40% of industrial turnover controlled by foreign owned firms. The share of BERD by foreign owned firms is even higher, at close to 41.5% (in 2009). Thus the country structurally relies on the R&D investments of a few large companies often with decision centres abroad, such as BASF, Bayer, EXXONMOBIL, ON Semiconductor, Philips, Procter and Gamble and Siemens¹³; which makes BERD sensitive to budget cuts abroad (and thus to economic conjuncture). Belgium is characterised by a relatively large share of SMEs, which typically make lower R&D investments and have low absorptive capacity for knowledge. Subsequently, fostering technological innovation could focus more on low-tech, service-oriented and/or entrepreneurial types of innovation. Also, focussed support for young innovative companies and multinational companies that choose Belgium for their R&D headquarters could broaden the business base and reduce the dependence on strategic decisions taken by multinational companies abroad (Bruno & Van Til, 2011; 2010), e.g.

¹³ Examples taken from the Top-50 of R&D intensive companies, appearing in the R&D-survey of 2008 and 2010 (ECOOM, 2011).

by acting on the legal framework for reducing the costs associated with intellectual property rights, tax burden, administrative red tape.

Challenge 3: Mobilising Human Resources for science and technology

While Belgium has strengths in terms of openness and international knowledge exchange (Innovation Union Competitiveness Report 2011) and a good level of education of the population, it needs to improve its human resource base in science and technology. An indication of this relative weakness is the low number of new doctoral graduates (ISCED 6) per 1000 population aged 25-34. Belgium has a ratio of 1.4 compared to the EU average of 1.5 (2009). The share of new science and engineering graduates among new tertiary education graduates is also well below EU-27 average (16.9% against 22% in 2009, 16.6% against 21.4% in 2010). Another indicator that is not improving in recent years is the share of the population aged 25-64 participating in life-long learning, which is also well below EU-27 average (7.1% against 8.9% in 2011). In addition, the focus on the use of the Belgian languages in the research grant systems for PhDs can be regarded as a barrier to European mobility as means of sourcing qualified human resources.

In case additional funding is realised, the shortage of researchers will remain an important issue. Apart from policies to improve the comparatively poor working conditions for researchers (salary, career prospects, financing for projects) increasing the numbers choosing to enter the profession (e.g. awareness and image-improving campaigns), improving the number of graduates in the S&T domains and creating easier access to the labour market for an increased number of foreign graduates are areas for improvement. In particular, the below-average remuneration of researchers in the higher education institutions (68% of the remuneration in the business enterprise sector in Belgium, CARSA 2007) as well as language restrictions¹⁴ hampers the internationalisation and the attractiveness of the Belgian system (Verbeek, 2007). This requires more effective measures to become an attractive country for researchers.

Another aspect of this challenge is related to the available budget for researchers (Challenge 1) and research projects, which potentially reduces motivation particularly for young researchers trying to build their research careers.¹⁵ Therefore, there is a challenge to increase the availability of opportunities for particularly young researchers, in order to prevent brain drain, which is regarded as a threat (De Standaard, 2010). To this aim, a number of programmes have been set up, such as Odysseus, Methusalem or the new Pegasus programme since 2011 in Flanders that are linked to the Marie Curie programme of the EU, or Brains Back to Brussels in the region of Brussels-Capital. In the Wallonia-Brussels Federation, thanks to the refinancing of the F.R.S-FNRS, new research mandates can be supported since 2010 (but the number of permanent researchers is still set at 400) and initiatives also exist to support researchers coming back to Belgium.

Challenge 4: Matching knowledge production with the economic fabric

Despite the high research outputs in quantitative and qualitative sense and relatively high investments in research centres and R&D measures, the take up by Belgian companies appears to be sub-optimal (Bruno & Van Til, 2010, 2011; ECOOM, 2011). The number of patent applications is 91% of the EU-27 average (IUS, 2011) and the Belgium triadic patent families seem low with a share of 0.8% (OECD, 2010). The main challenge is to link the accumulated research capacities to the economic eco-system. Several measures are in place in each region aimed at economic exploitation of research, but it seems that research outputs are not aligned with the absorptive capacity of the SME-dominated economy. In Flanders, strategic research

¹⁴ It is indeed regulated by law that PhD courses are offered in the community language only.

¹⁵ Remuneration of young researchers is particularly low when compared to similar countries (CARSA, 2007).

centres offer high-class and knowledge intensive services, but these are often only used to a limited extent by players from Belgium. IMEC, for instance, is considered to be a world-class research institute, but although it attracts a lot of industrial players from all over the globe, it struggles to link to Flemish companies, as this sector is marginally represented in Flanders. From a business perspective, the limited public support to an economically important sector like the chemical industry (in Flanders: 40% of BERD and 27% R&D personnel) is striking (Van Til, 2011)¹⁶. A recent review of the science production (publications), the technology production (patents) and the economic specialisation (employment) by ECOOM & EWI Department (2011) further substantiates a certain mismatch between knowledge production and the economy in Flanders (see Chapter 1). As already emphasised, this mismatch is also present in the other Belgian regions.

¹⁶ An initiative on sustainable chemistry has been in preparation, which resulted end 2011 in the establishment of a new Excellence Centre, the FISCH initiative.

4 Assessment of the national innovation strategy

4.1 National research and innovation priorities

Although there is no national strategy, each region/community has its own multi-annual plan that covers research and innovation (either as a sub-element of an overall plan or as a specific strategy), namely: the Flanders in Action initiative (Pact 2020); the Brussels-Capital Regional Innovation Plan (PRI 2006); the Walloon “Marshall Plan 2.Green” completed recently by the Research Strategy 2011-2015 and the Wallonia-Brussels partnership for researchers, both adopted by the Wallonia-Brussels Federation and the Walloon Region in 2011. Moreover, the 2011 Federal Government Agreement foresaw the drafting of an overarching inter-regional STI-strategy in order to reach the 3% GERD/GDP target and meet the goals of the National Reform Plan and the EU 2020 Strategy. The inter-regional/community plan would aim to improve the coordination and efficiency of STI policy.

Following the regional elections, the formation of the Walloon and the Wallonia-Brussels Federation governments was based on a common political strategy. This strategy has been translated into an operational plan called the Marshall Plan 2.Green (Plan Marshall 2.Vert, budget of €1.6b over five years (2009-14)), which endorses the 3% Objective and aims to improve competitiveness of firms by improving the performance and integration of research with industry. This plan is a continuation and a reinforcement of the previous plan implemented during the period 2006-09. The addition of ‘Green’ underlines the new orientations to better integrate ‘sustainable development’ as a crosscutting priority. The third priority area of the new plan ‘Strengthen scientific research as an engine of the future’ incorporates the main actions to be pursued during the 2009-14 period as regards STI policy. Funds from both authorities were sought to be invested in the implementation of a joint research strategy, which also involves the Brussels-Capital Region, and focuses on strategic crosscutting themes e.g. sustainable development, renewable energy, new technologies, longer life, etc.

As a follow-up, a Framework Policy was published in November 2011 entitled Research Strategy 2011-2015 “Towards an Integrated Research Policy”. This document sets out eight strategic objectives (including reiterating the 3% objective), identifies five priority thematic areas and includes a detailed plan of action for meeting the objectives. The five thematic fields identified are: sustainable development, energy, research in technological fields, health and ageing and quality of life. A first new measure was launched to support public-private partnership working on these thematic fields (PPP-2012). Although technically a policy statement of the Walloon - Wallonia-Brussels Federation governments, an additional aim of the Strategy is to develop a joint action plan with the Brussels-Capital region.

In addition, the Wallonia-Brussels Partnership for Researchers was also adopted in 2011. It is the contribution of the Wallonia-Brussels Federation to the implementation of the European Charter for Researchers, the European Code of Conduct, the European Commission Partnership for Researchers, the recommendations of the Helsinki Group on Women and Science and the human resources strategy of the “Innovation Union” of the European Union. It is worked out in twenty-five actions divided into six chapters, where public authorities undertake, alongside the actors in research, to place researchers at the centre of the priorities given to the consolidation of research as a driver of the future.

The Action Plan “Creative Wallonia” is another important component of the innovation policy in the Walloon region. This Plan brings together a number of measures based on a common philosophy:

- A vision on innovation that is not restricted to simple discovery or invention: innovating is modifying several elements with regards to the existing reference; this for the product level or service level itself as well as for its production, design, marketing, etc. It is no longer valid to consider an increase in R&D investments as being sufficient to make us innovators. Without a mental attitude aimed at systematic changes, all classic efforts will remain in vain.
- An innovation policy founded on the entire society – on a creative society. If innovation is the capacity to transform reality, creativity is the capacity to transform its perception of reality. In the contemporary world, the companies cannot be separated from the entirety of their normative, social and cultural context.
- This is clearly the reason why all of them must move on together. In this respect, Wallonia is not without assets: it consists in a rather compact territory, it has operational institutions, actual cultural diversity and numerous industrial spearheads in various sophisticated domains.
- The will to proceed through leveraged effect in order to convince rather than to impose.

The Regional Innovation Plan of the Brussels Capital Region (2006) covering the period 2007-2013 focuses on regional R&D strategic platforms, clusters and plans to increase regional R&D capacities up to the 3% target. This plan is the result of the agreement between regional government, universities, entrepreneurs and other regional stakeholders. It aims to implement a set of measures to improve the regional innovation capacity. It pursues six strategic objectives:

1. Promote the three most innovative sectors: ICT, Life Sciences and environment
2. Increase the rate of innovation through the implementation of specific programmes;
3. Stimulate the use of innovation through marketing research results and assistance to SMEs so that they assimilate and use innovations;
4. Foster the internationalisation of innovation;
5. Attract and anchor innovative activities;
6. Create an environment that favours innovation.

These objectives were made operational through the introduction of new support instruments and the consolidation of existing ones. The sectors were selected because of the identified potential as regards research, innovative content, growth and job creation in Brussels. In 2011 the region has started the preparation of a new RDI strategy for the region in line with the EU 2020 strategy. The objective is to elaborate a “smart specialisation strategy” for the region by identifying the sectors in which the region will invest, in order to reshape and adapt the financial measures and instruments, rethink a governance model and align the priorities with future EU funding (ERDF, HORIZON 2020).

Flanders in Action (FiA) is the central policy statement of the Flemish Government and is based on an agreement between the social partners aimed at making Flanders one of the top five EU regions by 2020. The FiA plan includes a number of goals related to research and innovation policies which the Minister for Science and Innovation Policy has set out in more detail in the

Policy Letter 2010-2011¹⁷. In 2011, the concept note on “Flanders Innovation Centre” indicated the importance of societal challenges and identified so-called ‘innovation crossroads (or hubs)’ where the strengths of the Flemish innovation system meet the needs of the Flemish society. The selected innovation crossroads were: Innovation in care; Eco-innovation; Green energy; Sustainable mobility and logistics; ‘social innovation’ and ‘innovation for transformation of industry’. The innovation crossroads should take into account the six strategic clusters identified in 2006 by the VRWI, after a foresight exercise and SWOT study and an assessment of societal needs through broad-ranging stakeholder round tables. The exercise is supposed to be repeated in 2012 whereby the VRWI should update the study and spearhead domains.

All three regional innovation policies put an emphasis on life sciences as a sector of growing economic importance (employment, or commercialisation of research for instance): the sector is one of the three priority areas of the Brussels-Capital innovation policy; in Wallonia, a competitiveness pole is dedicated to the life sciences and e-health policies are gaining in importance. It is a joint initiative by the three Ministers responsible for Health, Economy and Science & Innovation. In Flanders, the VIB has gained a strong position over many years in the biotechnology and life sciences, and there are new and reinforced initiatives such as the Flanders Care initiative (innovative health), the research centre CMI (medical innovation) and ageing and innovative health care.

Societal challenges are increasingly targeted by research policy since the community and regional elections in 2009. The main evolution is the focus put on broad societal needs and challenges in Flanders¹⁸ and on environmental and health concerns in all regions and in all communities and the willingness to increase collaborations between research actors in the academic and industrial sectors through the continuation of now well-established policies (competitiveness poles, mobilising programmes) and the launch of new ones (technological innovation partnerships in Wallonia, strategic platforms in Brussels-Capital) and the opening of new research centres focused on environmental or health issues. In Wallonia, in addition to sustainable development and energy, health and ageing/quality of life are also priority themes. The innovation crossroads defined in the new Concept Note Innovation Centre Flanders are all oriented towards societal challenges as well.

Over the last years, at Federal level, there has been a move to improve and optimise the fiscal incentives it can allocate to both scientific and industrial research. This effort has made some inroads into reducing the competitiveness gap for undertaking research in Belgium due to high wages and social charges. The most important measures at the Federal level are the various tax reduction schemes for R&D activities, introduced in the last five years. Given the limited scope for action in favour of enterprise level investments in innovation of the Federal authorities this orientation is coherent and responds to a long running criticism of the ineffectiveness of fiscal measures for R&D and innovation in Belgium.

Over the last years, the trends in the priorities of the policy-mix in each of the three Belgian regions have tended to display some distinctive features, reflecting their specific institutional and economic environments. At the same time, a number of measures are similar in their objectives yet differ in the approach to implementation. A common feature of both the Flemish and Walloon systems is the emphasis on measures aimed at encouraging increased co-operation between the research base and enterprises. A major difference between the two systems has been the strong focus in Wallonia on schemes aimed at encouraging knowledge diffusion through the

¹⁷ Main priorities are: (i) A focused innovation strategy, (ii) Improved innovation power for the economy, (iii) Making Flanders a top region by proving to be receptive for innovation, (iv) Reinforcing science as fundament of innovation; and Increase the intensity, efficiency and impact of R&D.

¹⁸ Identified in the aforementioned FiA process.

exchange or temporary assignment of skilled researchers or innovation specialists from the university/research centres to enterprises (and vice versa), the FIRST family of measures. In Flanders, this type of action is subsumed within more general industrial R&D subsidy schemes. The regions have all made commitments to invest more in R&D and there is concerted effort to focus this funding on either thematic or sectoral approaches such as the Flemish strategic research centres (IMEC, VIB, etc.) and competence poles, or the Walloon competitiveness poles and the Brussels clusters and strategic platforms. An interesting recent evolution is the strong focus on the coordination/opening of programmes (cf. competitiveness poles, S&T awareness raising campaigns) between the Walloon and the Brussels-Capital regions, accelerated since 2011 and the strong coordination of policies between Wallonia and the Wallonia-Brussels Federation.

4.2 Evolution and analysis of the policy mixes

The policy priorities and the mix of measures implemented by the Belgian authorities have not changed significantly over the last five years. Wallonia and Wallonia-Brussels Federation Research have published their first multi-annual strategy Research 2011-2015 “Towards an integrated research policy”. For the rest, the emphasis has rather been on consolidating and expanding existing policy initiatives (for instance, strategic research centres in Flanders, Competitiveness clusters in Wallonia, Impulse programmes and Strategic Platforms in the region of Brussels-Capital reinforcing the financing and restructuring of university researchers). At the same time, the three Belgian regions have continued to adapt and focus their policy effort to their specific institutional and economic environments. In Flanders, several initiatives have been taken in recent years in the field of renewable energy e.g. with the setup of ICleantech, Energyville, a testing ground on Electric Vehicles and the VEB (Flemish Energy Company).

The financial weight of the budget of the policy measures, as presented in the European Inventory of Research and Innovation Policy Measures, helps to shed light on the responsiveness of the policy mix to the structural challenges identified in Chapter 3. In terms of overall funding flows, the focus of the public sector is clearly on reinforcing the knowledge base, both in terms of investing in research infrastructure and research grants (in the higher education sector and strategic research centres) and on promoting scientific and technological careers.

In 2010 (see Bruno & Van Til, 2011), approximately two thirds of government intervention was focused on the broad field of research and technology representing €618m, out of which 33% for policy measures concerning excellence, relevance and management of research in universities; 30% for R&D cooperation (seven measures); and 30% for direct support of business R&D (11 measures).

The second main field is horizontal research and innovation policies (total of €254m) where more than 66% goes to strategic research policies (such as the federal research programmes, Strategic Research in Flanders, regional impulse programmes in Brussels-Capital, mobilising programmes in Wallonia or other such measures). The focus here is primarily on orientating the use of public R&D budgets towards societal issues and to some extent leveraging BERD through partnerships (challenge 2).

An on-going process of restructuring of the research potential continues at regional level with, for instance, the opening of new research centres such as the Flemish Centre for Medical Innovation (in 2010) and WELBIO in Wallonia (in 2009). The opening up of new research centres leads to competences in several areas, presumably attracting both researchers and companies.

Increasing the R&D budgets allocated to scientific research and improving the co-operation with industry clearly is the priority and receives the lion's share of public funding, about 8% of the

estimated public budgets also aim at improving the overall quantity and quality of human resources for science and technology. As this calculation does not include the close to half-billion euro of annual foregone tax revenues (2010) from the Federal wage tax reduction for researchers, the policy-mix is clearly giving a significant emphasis to tackling challenge 3.

A number of measures aim at fostering research industry collaboration and commercialisation of research results (Challenge 4). The strengthening of research industry collaboration is promoted through new initiatives such as the Public-Private Partnership (PPP-2012) programme in Wallonia; in thematic strategic platforms in Brussels; and the “spearhead” policy in Flanders (and in addition the focus on societal challenges by way of 6 Innovation Crossroads as described in the Concept Note Innovation Centre Flanders of May 2011). Softer instruments primarily aiming at innovation support and management services also focus on Challenge 4, but are relatively smaller in budgetary terms with about 5% of the research and innovation policy funding allocated by the Belgian authorities. Similarly, the launch of the programme Creative Wallonia in 2010 underlines the recognition by the regional authorities of the need to boost non-technological innovativeness in SMEs.

Finally, in terms of demand side innovation policies, although the Belgian authorities (collectively) have sought to use investment in space research (through the European Space Agency) as a form of pre-competitive public procurement, the use of public procurement to stimulate research and innovation is not yet widespread. However, 10 projects for sector specific knowledge investments through pre-competitive public procurement were defined in 2009 in Flanders¹⁹.

In terms of related policies, the higher education sector has been undergoing changes in the framework of the Bologna process. This led to a partnership (or quasi-merger) of smaller HEIs (university colleges, autonomous faculties, third-level institutes) with one of the major universities in each Community. The commitment of the Belgian authorities to implementing the requirements of the European partnership for researchers is also strong. These process lead to higher compatibility of research and higher education with other EU countries and thus lowers barriers for mobility. However, language requirement and remuneration levels of researchers are de-facto barriers.

Finally, there is a strong and growing focus on environmental issues in Wallonia and Brussels-Capital and on societal challenges (such as health, energy, and eco-innovation) in all regions.

4.3 ASSESSMENT OF THE POLICY MIX

Broadly speaking when assessing the policy mix, there is a need to keep in mind that while the Belgian research and innovation performance could be higher, in overall terms the country is firmly located in the top half of the ‘league table’. Equally, despite concerns expressed in various reviews about ‘co-ordination and synergies’ due to the multi-level governance context, there are clear signs that the Belgian authorities have understood the need to optimise (if not rationalise) the public support provided via various governments and their agencies and to seek, where relevant, enhanced synergies.

As noted above, the policy mix and focus of policy effort has not changed dramatically over the last five years (and it could be argued over a decade). A considerable policy effort and corresponding investment has been made in reinvesting in scientific research (via the Federal Government and the Communities) and on enhancing the attractiveness of Belgium as a place to conduct both scientific research (the communities) and science-industry collaboration and

¹⁹ A follow-up of the Flemish participation as project leader in an EU funded OMC project.

commercialisation (the regions). At the same time, the targeting or strategic orientation of this investment has been subtly changing through a mix of competitive funding programmes and investments into thematically specialised research facilities and centres. The driving forces behind this specialisation are both economic (ensuring that the business sectors are assisted to reconfigure towards new competitive products or that new higher value added sectors emerge) and societal (e.g. dealing with environmental degradation nationally and contributing to tackling climate change globally).

The Belgian policy mix (at all levels) is sophisticated and the various authorities have put in place or further improved a mix of policy advisory and strategic intelligence actions that provide a stronger basis for policy decisions than existed a decade ago. Equally, the evaluation of policy outcomes has become an increasingly, if not systematically, applied tool to assist in improving policy effectiveness.

This said, the trends in research and innovation performance discussed above, and the evidence from benchmarking exercises such as the IUS, tend to suggest that the rate of improvement both in terms of increasing investment intensity and in terms of innovation performance are insufficient to meet the targets set in policy strategies. In particular, the following observations can be made.

- There is little chance of Belgium meeting the 3% GERD/GDP target even by 2020, even if the Belgian authorities have confirmed the 3%-target. The tax credits as well as other broader tax measures are adding funds to the research system, but are not counted in the calculations. Public investment is on slightly upward trend but even, for instance, the doubling of public investment in Wallonia over the last decade has only inched the region up to 2% GERD/GDP intensity. Even if the public investment gap with the EU-27 average was closed or surpassed, this would still leave a considerable gap of more than half a percentage point to be met by the business sector. Given current industrial structures, this is unlikely to happen. An obvious conclusion is that the Belgian authorities should be invited to reconsider their investment target for R&D and set a target that is achievable given the parameters of public finance and industrial structure that exist; or explain what additional measures they will take to meet the 3% objective.
- There is a need to be wary of hasty conclusions that the current policy mix is not working due to the lack of significant progress. Given the economic crisis over the last five years, the Belgium economy and research and innovation system appears to have ‘weathered’ the storm better than some other neighbouring countries. The introduction and extension of R&D tax reductions on researchers salaries (in both the higher education and business sectors) may very well have acted as an ‘automatic stabiliser’ without which R&D intensity would have declined rather than remaining relatively stable. Similarly, tax incentives for business such as the notional interests²⁰ measure may have contributed to maintaining the relative attractiveness of Belgium as a place to do research. This type of hypothesis requires validating and it would be timely to see an

²⁰ The “notional interest deduction” enables all companies subject to Belgian corporate tax to deduct from their taxable income a fictitious interest calculated on the basis of their shareholder’s equity (net assets). The main purpose is to reduce the tax discrimination between debt financing and equity financing. Indeed, in the case of loan capital, the interest paid is deductible from the taxable base, while with equity capital the dividends are taxable. These rules are intended to have the following positive effects: a general reduction of the effective corporate tax rate for all companies, and a higher return after tax on investment and the promotion of capital-intensive investments in Belgium; and an incentive for multinationals to examine the possibility of allocating such activities as intra-group financing, central procurement and factoring to a Belgian group entity.

evaluation of the R&D tax measures to understand if they are maintaining current or inducing additional R&D spending by the beneficiaries.

- The structuring of the higher education system (in both Communities) into larger institutions ('associations' or 'academies' bringing together several third level education institutes) should foster, if the correct policy incentives are in place, a corresponding realignment of research potential (e.g. greater scope for inter-disciplinary work or merging or pooling of research teams across formally autonomous institutes). This is one element that would help to reduce fragmentation of the overall Belgian research system and further improve its performance. At the same time, the balance between institutional and competitive funding of the system would merit further review in order to further focus and concentrate efforts. Finally, while the remit of the Federal Government to fund 'nation' wide research programmes has been further diminished (with the decided transfer of the inter-Community programmes Inter-University Attraction Poles and Technology Attraction Poles to the Communities and the Regions), there is a clear (financial at a minimum) rationale for organising joint programming, sharing certain research infrastructures or 'pooling' research efforts (e.g. the Scottish example of research pools could be applied) between Flemish, Brussels, Walloon and Wallonia-Brussels based research teams in certain fields. This has already been possible for coordinating Belgium's participation into research infrastructures of the ESFRI roadmap. It is to be hoped that the proposed Inter-Federal Plan for Research and Innovation will lead to concrete initiatives.
- The efforts to structure and develop major thematically, sectorally or technologically specialised 'clusters' of R&D and innovation over the last decade (and in the case of Flanders several decades) through strategic research centres, excellence centres, competitiveness poles, clusters and targeted research programmes need to be pursued and further consolidated. The evidence from the Flemish strategic research centres (IMEC, or VIB for instance) suggests that it may take over a decade before such initiatives become fully operational and realise their objectives, achieve 'critical mass' and attain international recognition. The Walloon competitiveness clusters and the research and technology centres created over the last decade will need sustained funding, regular evaluation and expert management if they are to begin to contribute effectively to structural adjustment of the economy. The realignment of research and innovation policies to contribute to tackling the structural adjustment of the economy or for taking on societal (grand) challenges such as the environment and climate change, will require better orientation and focus of the limited amounts of public funding available in the coming years with the need to possibly cut funding from non-priority centres or sectors. This implies the need for a political will to close or merge structures created over the previous decades.
- Aside from the Federal R&D tax measures, business R&D and innovation is supported via a range of measures managed by the regional authorities. The innovation policy mix has evolved over recent years but remains essentially based on grants (or reimbursable loans) for individual firms to undertake R&D. The IUS 2010 suggests (based on Community Innovation Survey (CIS) data) that the intensity of business innovation activity, notably non-technological innovation, is not improving and that the impact of such activity is not as positive as would be hoped in terms of boosting turnover from new products. Despite initiatives such as the VIS (Flemish Innovation Co-operation network) programme in Flanders or new coordinating agencies such as the Walloon Technological Stimulation Agency (AST) aimed at identifying and supporting firms with a potential to innovate more intensively, the situation has not evolved positively. There is

a need for a further re-assessment of the effectiveness of the direct support measures and of intermediary support structures that are often over-complex and fragmented that would lead to a more radical ‘pruning’ of the system to ensure value for money. In 2011, an update started of the report drafted by the Soete-commission in 2006 on the Flemish STI-landscape. The results have recently been published. At the current time, there is limited recent evaluation evidence on the effectiveness of the measures in place and a wide-ranging evaluation and review would be beneficial in each region in order to focus regional support on initiatives best able to contribute to raising the intensity of industrial R&D and innovation (including service sector and non-technological forms of innovation).

- Finally, the issue of public sector innovation is given a remarkably low priority in policy declarations or strategies, except for e-practices in all entities and public procurement for innovation in Flanders. Many observers would consider that the potential to increase the efficiency of public expenditure in Belgium and the effectiveness of services provided to the population is significant.

The table below summarises the policy response to the challenges identified in chapter 3 of this report.

Table 1: Challenges, Policy measures and assessment of appropriateness, efficiency and effectiveness

Challenges	Policy measures/actions addressing the challenge ²¹	Assessment in terms of appropriateness, efficiency and effectiveness
Increasing co-ordination and synergies within the governance system	<p>December 2011 Federal Government Agreement foresees an inter-federal research and innovation plan</p> <p>March 2011 Strategy 2011-2015 (Framework note) on an Integrated Research policy for the Wallonia-Brussels Federation, Wallonia (and Brussels-Capital)</p> <p>The (national) interministerial council for science policy (uniting all ministers in charge of research) is addressing issues concerning improving national co-ordination as well as issues regarding a better co-ordinated approach towards Europe.</p>	<p>Recent assessments (e.g. ERAC peer review 2011) concluded that fragmentation hampers the effectiveness and efficiency of the Belgian STI system. The transfer of the Interuniversity Attraction Poles (IAP) and Technological Attraction Poles (TAP) Federal measures further reduces inter-federal funding.</p> <p>Increasing integration and co-ordination of Walloon- Wallonia-Brussels Federation-Brussels-Capital policies with further actions foreseen by March 2011 action plan</p>

²¹ Changes in the legislation and other initiatives not necessarily related with funding are also included.

Challenges	Policy measures/actions addressing the challenge ²¹	Assessment in terms of appropriateness, efficiency and effectiveness
Under-financing of research	Government budgetary commitment to increase appropriations or refinance scientific research funds.	<p>The various Belgium authorities have all increased public spending on R&D and are committed to continuing to do so. However, the public debt has increased and this places a strain, along with the financial crisis and growing unemployment on public budgets available for research.</p> <p>The structuring of public-private research efforts in the form of strategic research centres, competitiveness poles is a good step towards an embedding and attracting force for the large foreign R&D players.</p> <p>The high tax burden and relatively high labour costs remain a negative element for conducting research in Belgium.</p> <p>The tax credits are however reducing the wage costs for researchers with approximately 15 %.</p>
Mobilising Human Resources for science and technology	<p>Federal R&D wage tax reduction measures</p> <p>Range of measures at Federal, community and regional levels to support international mobility, industrial PhDs, recruitment of innovation managers, S&T studies</p>	No robust data (yet) or evidence to allow a judgement as to whether the policy measures are paying off in terms of reversing brain drain or attracting more people to work in research or innovation careers.
Matching knowledge production with the economic fabric	Instruments include: Flemish strategic research centres and competence poles, Walloon Competitiveness clusters, support for business angels, regional risk capital measures, incubators and funding for university technology transfer centres	There is quite a comprehensive set of measures in place, targeted at interfaces between research institutions (incl. universities) and companies. Assessing the efficiency and effectiveness of these measures is out of scope of this report. However, there seems to be a certain mismatch between knowledge production and the economy from a sector viewpoint.

Nb: Please note that the list of policy measures is not extensive, as there are more than 75 measures in total

5 National policy and the European perspective

The key research and innovation challenges in Belgium are to increase synergies within the governance system, increase the financing of R&D of governments and the private sector, increase the financial attractiveness of research positions and the inflow of doctoral students and to match (policy instruments that stimulate) knowledge production with the economic fabric of the country.

The main routes forward to deal with the challenges are discussed and appraised in Section 3. The section below provides a brief generic assessment of the alignment of the national policies with the 5 ERA priorities, as identified by the ERA Communication July 2012.

1. Effectiveness of national research systems

The newly formed federal government (November 2011) has reinforced the basic political division of labour between the federal and regional/community entities. As the Federal Government retains most of the competences for fiscal measures, decisions taken at federal level can influence the community and regional research and innovation policies, in particular when it comes to tax deduction schemes.

Main challenges as regards the effectiveness of the Belgian Innovation System are:

- The relatively low levels of competitive funding; its increase could therefore give an additional incentive to universities to reach a high level of excellence in knowledge production. Yet the Flemish universities score very well internationally, as becomes clear from the Flemish rectors' opinion paper on their universities' research performance in all scientific domains, from the universities' high scores in international rankings (www.topuniversities.com) and from the number of ERC grants obtained.
- The relatively weak monitoring and evaluation systems in place at federal, regional and community levels, except for the ECOOM service in Flanders.
- The quality of HEI as Research Institutions is under pressure due to the faster increasing number of students compared to the increasing of personnel at HEIs.

Policy changes have been marginal since 2011. Several Action plans are being adopted/implemented to improve the position of researchers. Belgium is committed to implement the European Charter for Researchers and Federal tax breaks for recruitment of researchers are maintained. Additional funding for universities of the Flemish Community is also distributed based on an allocation key, which is partially based on scientific output indicators.

Given the problematic financial situation and the political will to arrive at a balanced budget in 2015, several austerity measures were already taken. It is positive that tax deductions and other fiscal measures to support R&D are continued under the new Federal Government. Under review are, nonetheless, indirect subsidies of researchers ('wetenschappelijke Maribel' or 'Maribel scientifique'). The Flemish Government continues to increase its annual public budget for R&D and innovation. The Governments of Wallonia and of the Wallonia-Bruxelles Federation are continuing their efforts to intensify investment in R&D and in innovation and to improve the effectiveness of policies linked to European guidelines, in particular, the flagship initiative "The Union for innovation". It is firstly a matter of supporting excellence in scientific research and

making Wallonia's active participation in the European Research Area more robust. Secondly, emphasis is placed on the distribution and development of results of research and innovation in the widest sense within the economic fabric, as well as on improving the functioning of the regional innovation system in all its elements. In this perspective, the implementation of the 2011-2015 Integrated Research Strategy and the "Creative Wallonia" Plan has been continued. The Government of the Wallonia-Brussels Federation, by decree, recently consolidated the legal and budgetary basis of all Funds associated with Scientific Research Funds (FRSFNRS). That allows financial efforts made by public powers to be continued, as well as the jobs of the researchers. Also in terms of research infrastructures, current involvements are under review such as the Belgian investments in the Antarctic, including the maintenance of the Princess Elisabeth station.

2. Optimal levels of transnational co-operation and competition

International cooperation in Belgium is relatively well developed and in this regard the most apparent challenge is to further work towards a more integrated approach at the national level, by coordinating the scattered initiatives at community and regional levels insofar as the regional and community competences are respected.

With regard to cross-border cooperation, Belgium is strongly engaged in a range of European initiatives, as well as a range of federal, Community and regional initiatives. These initiatives include multilateral agreements, bilateral agreements, joint-R&D projects and shared research infrastructures.

- Knowledge exchange with EU partners is given strong emphasis at a regional level. The co-publication rate of institutes of the Flemish Community is among the highest in Europe and also the number of non-Belgian residents is relatively high. Flanders has a number of cooperations in Dutch-Flemish context and with Nordrhein-Westphalia in the field of sustainable chemistry and microtechnology, whereas Wallonia and the Wallonia-Brussels Federation have developed cooperations mainly with neighbouring countries and French-speaking areas.

In terms of recent policy changes, no significant changes have taken place. All authorities are involved in European and inter-regional co-operation initiatives in field of research and innovation. Internally, there is a better cooperation between Wallonia and the Brussels-Capital region. Opening up of R&D programmes is slowly emerging in Belgium, though most R&D programmes are still relatively closed. In addition to the federal programme in space research and a few international programmes, all federal research programmes are open for participation of research teams of EU Member States (with a limit of 50% funding).). For Flanders, the IWT R&D-support programmes are open to foreign research institutes as a subcontractor of a company that is located in Flanders. At the FWO, predoctoral fellowships are open to all students having obtained a Master's degree in one of the European member states. For the postdoctoral fellowships there are no nationality restrictions whatsoever. Foreign researchers can moreover act as co-promoters of research projects lead by a Flemish PI and programmes like Pegasus and Odysseus are meant to attract foreign researchers to Flanders specifically.

The Conceptnote on Innovation Centre Flanders of 2011 defined six innovation hubs that respond to the grand challenges e.g. care innovation, eco-innovation, social innovation etc.

According to the European portal on RI, the Belgian RI provides essential resources, at a high cost. They are open to external researchers and have a clear European dimension and added value. Improved coordination at national level could lead to more critical mass at this level.

Bundling of initiatives for example in computing could lead to a stronger Belgian position, thus leading to win-win situations for all regions involved. Belgium is quite strongly engaged in a wide range of international research infrastructure (RI) projects, for example via the FWO's Big Science programme, while also strongly developing national and regional research infrastructures. Given the keen eye for the development of RI in Belgium, a challenge might be to look for further synergies in RI at cross-regional level.

3. Openness of labour markets for researchers

In general, the Belgian authorities are strongly committed to and participate in European initiatives. In a number of cases this commitment matches national/regional challenges or priorities. For instance, the steps taken to implement the European Partnership for Researchers should make it easier to attract and retain qualified human resources. The FWO's HR label Excellence in Research shows the efforts are fruitful.

A main challenge as regards the labour market for researchers is the relatively low remuneration of researchers compared to comparable countries as well as a very low participation of women in research. To a certain extent also a mismatch may be identified in the supply and demand for high-skilled researchers and engineers: there are indications that there is a shortage of highly skilled engineers and scientists in the field of physics, chemistry and IT. Lastly, in an EU perspective, regional regulations prescribe the use of the community languages at HEIs, which is a barrier to foreign researchers.

4. Gender equality and gender mainstreaming in research

A main challenge as regards gender equality compared to comparable countries is the very low participation of women in research.

Flanders adopted the Open Method of Coordination (OMC) approach; the university council [VLIR](#) has set up an equality policy and working group to improve the position of women in science. In the Collective Labour Agreement for universities several agreements have been made to reduce the negative effects of career breaks on women's research careers²². Career breaks such as maternity leave do not impose a regulatory threat to the women's career; nevertheless, pregnancy is still identified as a 'competitive disadvantage' (VLIR, 2008).

The FWO for example extends the fellowship of female researchers with one year to compensate for the pregnancy leave.

To ensure that gender policy at universities is developed bottom-up, the Flemish Interuniversity Council (*Vlaamse Interuniversitaire Raad/VLIR*) set up the Gender at Universities high-level action group. The group aims to improve the gender balance among professors, researchers and students by a gender action plan at the level of the universities. In the course of 2013 this action plan will be translated in an interuniversity charter on gender equality that will contain obligatory clauses.

The new legislation regarding the research funding through the special research funds (valid from 1 January 2013) pays a lot of attention to the gender balance in the universities:

²² It is forbidden to terminate a permanent employment contract and prematurely terminate a fixed term employment contract during pregnancy or during the period in which the employee is on maternity leave, or during a period of six weeks after resuming work or a period of incapacity for work as a result of the birth or the preceding pregnancy following maternity leave.

- One of the performance indicators used to calculate the sum per university is a diversity parameter that looks at the number of female researchers at postdoctoral and permanent level:
- As long as there is an underrepresentation of one of the sexes at postdoctoral and permanent level (per faculty), in recruitment procedures with equal candidates priority must be given to the underrepresented sex.

Administrative boards, research councils and selection juries must be gender balanced.

Labour law and rules are not only affecting researchers but all other labour market participants. In this respect, the Government Agreement of 1.12.2011, the basis for the new federal government, states the extension of anonymous curriculum vitae for applications in the public sector (first round). A specific law will also be established concerning equal pay.

The “Wallonia-Brussels Partnership for researchers” is ongoing and in 2012 a total of over €1.5 million was allocated to its implementation, in particular through support for 10 doctors in the job market, development of doctors in public service, insertion of a “genre” approach in scientific careers and the perpetuation of 10 researchers in the FRS-FNRS. (Scientific Research Fund – National Scientific Research Fund) No initiatives could be found.

The implementation of the Creative Wallonia Plan is ongoing. This plan, which aims to favour the emergence of a generalised culture of innovation in Wallonia, mainly targets the world of teaching and businesses, SMEs in particular. It can be broken down into about thirty actions, aimed at promoting the creative economy (awareness, training), fertilisation of innovative practices and support for innovative production, with an emphasis on SMEs placing innovations on the market. The networking, external openings, ICT etc. are the levers that cut across the Plan. At the moment, 22 actions (that is 67%) are in the implementation or preparatory phase.

In Flanders, the FWO makes sure that in its scientific evaluation panels no more than two thirds of the experts are of the same sex. Moreover, Flemish Minister for Innovation Ms. Ingrid Lieten has strongly encouraged the universities to increase their efforts in getting more women in university management.

5. Optimal circulation and transfer of scientific knowledge

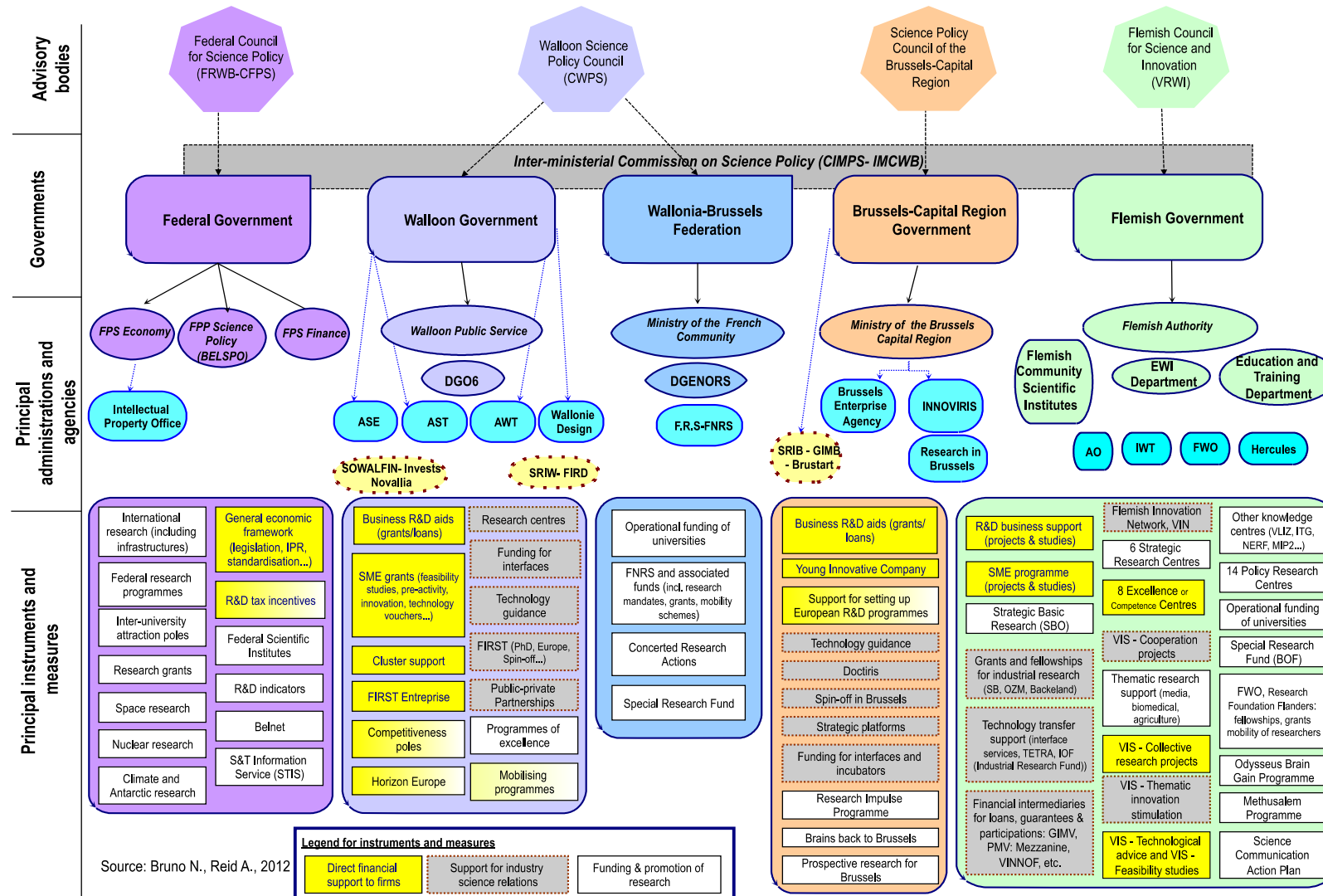
The joint execution of research projects appears to be the most direct method for the transfer of technology between universities and industry, so that the knowledge and expertise present in the universities can be valorised as far as possible for the benefit of the regional economies. This is organised in a range of measures, such as the strategic basis research facility, TETRA-fund, or the Baekeland fund provided by the Innovation Agency IWT in Flanders.

Inter-sector mobility is stimulated indirectly via the increased use of programmatic funding for competitiveness poles in Wallonia, excellence centres (or competence poles) in Flanders, and strategic platforms in Brussels. These poles or centres include public-private interaction to increase inter-**sectoral** mobility.

The Belgian Communities regions fund knowledge transfer offices (the so-called interface structures) at their respective universities and other HEIs under their competencies located on their territory, the so-called TTO's. Interface structures have the mission of stimulating external contacts at the universities.

Annex

Figure 1. Overview of the Belgian STI governance system



Source: Bruno N., Reid A., 2012

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List of Abbreviations

AEQES	Agency for the Evaluation of the Quality of Higher Education provided by the Wallonia-Brussels Federation
AgODi	Agency for Education and Training
AO	Enterprise Agency Flanders
ASE	Walloon Economic Stimulation Agency
AST	Walloon Technological Stimulation Agency
BELSPO	Belgian Federal Science Policy Office
BERD	Business Expenditures on Research and Development
BOF	Special Research Fund (Flanders)
BRISTI	Belgian Report on Science, Technology and Innovation
CERN	European Organisation for Nuclear Research
CFS	Federal co-operation
CIMPS/IMCWB	Inter-Ministerial Conference for Science Policy
CIS	International Co-operation or Community Innovation Survey
CLARIN	Common Language Resources and Technology Infrastructure
CLINiCOBRU	Platform for clinical research common to the three hospitals in Brussels
CMI	Centre for Medical Innovation
COST	European Cooperation in Science and Technology
CTLO	Centre Traditio Litterarum Occidentalium
CWPS	Walloon Council of Science Policy
DG R&D	DG Research and Innovation
DGENORS	Directorate-General for non-obligatory education and scientific research of the Wallonia-Brussels Federation
DGO6	Walloon Operational Directorate General for Economy, Employment and Research
ECOOM	Flemish Expertise Centre for R&D Monitoring
EIROforum	European Intergovernmental Research Organisations Forum
EMAS	Environmental Management System
EPO	European Patent Office
ERA	European Research Area
ERA-NET	European Research Area Network
ERDF	European Regional Development Fund
ERP Fund	European Recovery Programme Fund
ESA	European Space Agency
ESF	European Social Fund
ESFRI	European Strategy Forum on Research Infrastructures
ESO	European Organisation for Astronomical Research in the Southern Hemisphere
ESRF	European Synchrotron Radiation Facility
ESS	European Social Survey
EU	European Union
EU-27	European Union consisting of 27 Member States
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
EUROHORC's	European Heads Of Research Councils
EWI	Department for Economy, Science and Innovation of the Flemish Government
F.R.S-FNRS	National Scientific Research Funds of the French Community
FDC	Flanders District of Creativity
FDI	Foreign Direct Investments
FFEU	Finance Fund for Paying of Debts and Investments

FiA	Flanders in Action
FISCH	Flanders Innovation Hub for Sustainable Chemistry
FIRST	Training and Impulsion to Scientific and Technological Research
FIT	Flanders Investment and Trade
FP7	Seventh Research Framework Programme 2007-2013
FRIA	Fund for Research and education within Industry and Agriculture
FRWB-CFPS	Federal Science Policy Council
FTE	Full Time Equivalent
FWO	Research Foundation Flanders
GBAORD	Government Budget Appropriations or Outlays on R&D
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditures on Research and Development
GOVERD	Government expenditures on Research and Development
GUF	General University Funds
HADES	High Acceptance Di-Electron Spectrometer
HEI	Higher Education Institution
HERD	Higher Education Expenditure on R&D
HRST	Human Resources in Science and Technology
IAP	Interuniversity Attraction Poles
IBBT	Interdisciplinary Institute for Broadband Technology
ICC-INFRA	International Cooperation Commission/ Infrastructure
ICOS	Integrated Carbon Observation System
ICT	Information and communication technology
IEC	International Economic Commission
ILL	Institut Laue-Langevin
IMEC	Interuniversity Micro Electronics Centre
INNOVIRIS	Institute for the support of Scientific Research and Innovation of Brussels
INPAC	Institute for Nanoscale Physics and Chemistry, University of Leuven
IOF	Industrial Research Fund
IPR	Intellectual Property Rights
IUS	Innovaton Union Scoreboard
IWT	Agency for Innovation by Science and Technology
JRC	Joint Research Centre
JTI	Joint Technology Initiative
KTO	Knowledge Transfer Office
KULeuven	Catholic University of Leuven
LIEU	Liaison Entreprises-Universités
NANO- IRIS	Expertise platform specialised in the toxicology of nano materials
NRP	National Research Plan
OECD	Organisation for Economic Cooperation and Development
OMC	Open Method of Coordination
PASS	Scientific Adventure Park
PMV	Participatie Maatschappij Vlaanderen
PPP	Public-Private Partnerships
PRACE	Partnership for Advanced Computing in Europe
PRINS	Pan-European Research Infrastructure for NanoStructures
PRO	Public Research Organisation
R&D	Research and development
RBINS	Royal Belgian Institute of Natural Sciences
RI	Research Infrastructures
RTDI	Research, Technology, Development and Innovation
S&T	Science and technology

SCI	Science Citation Index
SF	Structural Funds
SHARE	Survey of Health, Ageing and Retirement in Europe
SIM	Strategic Initiative Materials
SME	Small and Medium Sized Enterprise
SOWALFIN	Walloon SME Financing Agency
TAP	Technological Attraction Poles
TBM	Programme for Applied Biomedical Research (Flanders)
TEA	Total Entrepreneurial Activity
T-EMAT	Electron Microscopy for Materials Science, University of Antwerp
TTO	Technology Transfer Office
UCL	Liege Catholic University
USPTO	United States Patent and Trademark Office
VC	Venture Capital
VEB	Flemish Energy Company
VIB	Flemish Interuniversity Institute for Biotechnology
VINNOF	Flemish Innovation Fund
VIS	Flemish Innovation Co-operation network
VITO	Flemish Institute for Technological Research
VLIR	Flemish University Council
VLIZ	Flanders Marine Institute
VRWI	Flemish Science and Innovation Council
VUB	Free University Brussels
WBI	Wallonia-Brussels International
WELBIO	Walloon Institute for Life Sciences

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Abstract

This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). The main objective of the ERAWATCH Annual Country Reports is to characterise and assess the performance of national research systems and related policies in a structured manner that is comparable across countries.

The Country Report 2012 builds on and updates the 2011 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context. They further analyse and assess the ability of the policy mix in place to consistently and efficiently tackle these challenges. These reports were originally produced in December 2012, focusing on policy developments over the previous twelve months.

The reports were produced by independent experts under direct contract with IPTS. The analytical framework and the structure of the reports have been developed by the Institute for Prospective Technological Studies of the Joint Research Centre (JRC-IPTS) and Directorate General for Research and Innovation with contributions from external experts.

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.

